



**National Congress on Medicinal Plants
16, 17 May 2012
Kish Island**



In the name of Allah

Dear Participants

On behalf of the National Network of Research and Technology in Medicinal Plants I would like to welcome you to the National Congress of Medicinal Plants.

In recent years, an increasing attention has been paid to different research areas of medicinal plants in Iran. It made us to organize this congress for gathering scientists to share their scientific findings and also extend their collaborations. We intend to hold the congress every year.

I hope that all participants enjoy the scientific presentations through oral lectures and posters and also the beautiful environment of Kish Island.

I would like to take this opportunity to thank our many colleagues in organizing and scientific committees who have helped put the congress together. It really has been a great team effort.

Finally, I thank all sponsors for their financial support.

Peyman Salehi

Congress Scientific Chairman



National Congress on Medicinal Plants
16, 17 May 2012
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**ABSTRACTS OF
ORAL
PRESENTATIONS**



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



STUDY ON SOME ECOLOGICAL FACTORS, MORPHOLOGICAL TRAITS, ESSENTIAL OIL PRODUCTIVITY AND PLOIDY LEVELS OF *THYMUS ERIOCALYX* (RONNIGER) JALAS IN IRAN

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In order to evaluate several ecological factors, morphological traits, essential oil productivity and ploidy levels of *Thymus eriocalyx* (Ronniger) Jalas with uses of DSS method ten natural habitats were selected in Lorestan, Markazi, Hamadan, Kermanshah and Kurdistan provinces in Iran. To study and evaluate quantitative morphological characters, five complete plant samples and flowering branches were collected from each locality at flowering stage for essential oil extraction in spring season in 2008. Seeds also were collected in seed production season to study seed characters, chromosome counting and ploidy level. Ecological data of ten localities also were recorded. Vegetative and reproductive traits and essential oil quantitatively of each population were studied. At least 10 mitotic cells of each population were studied to determine chromosome numbers and ploidy levels. The results were analyzed using cluster analysis method with SPSS software. Populations were clustered based on vegetative, reproductive characters, ecological factors and essential oil amounts. All populations were classified in 4 groups. Results revealed that specimens from "9 population" had the most average length and width of inflorescence leaf, inflorescence leaf length to width ratio, stem leaf length to width ratio, petiole long, calyx tube longitude, corolla long and the most average length and width of bracteole. Chromosome counting results showed that specimens of 1, 2, 3, 4, 5, 6 and 8 populations were diploid ($2n = 2x = 30$) and specimens of 7, 9 and 10 populations were tetraploid ($2n = 4x = 60$). The highest essential oil productions belong to 5 populations (3.04%). In total, 183 companion species was identified for *Thymus eriocalyx* that the highest and the least life form of companion species in accordance with Raunkier classification were related to hemicytophyte and phanerophyte life form, respectively [1].

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MUTAGENIC AND ANTIMUTAGENIC PROPERTIES OF *SATUREJA SAHANDICA* BORN ESSENTIAL OIL

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The free radicals induce lipid peroxidation, disruption of cellular structures, inactivation of enzymes and ion channels through protein oxidation and nitration, and DNA damages, Therefore free radicals are Considered to be the main reasons many of today's diseases. So according to the known beneficial effects of medicinal plants, currently its are the main candidate to replace the chemical compounds for treatment of diseases. Considering the growing interest in the use of essential oils, assessment of their effect, particularly effects on genetic material is necessary. *Saturja sahandica* Born is well known aromatic and medicinal natural plant in Iran, which is widely used as tea or additive in commercial spice mixtures for many foods to offer aroma and flavor. Investigations on the biological activities of *Saturja* species are scarce. In this study mutagenic and antimutagenic properties of Iran native *Saturja sahandica* Born was investigated.

Mutagenic and antimutagenic activities evaluated by Ames test with nitrofluorene and 2-aminoanthracene mutagens (for *S. typhimurium* TA98) and sodium azide and 2-aminoanthracene (for *S. typhimurium* TA100) with or without metabolic activation (S9 mix). Amounts of Mutagenicity for TA100 and TA98 with S9 were 12.9% and 18.5% respectively; Without S9, they were 4.46% and 21.6%. Inhibition of mutagenicity was around % 49% and 9.3% for TA98 with or without S9, respectively; For TA100 these percentages were 26 % and 85.95%. It had no mutagenic effect. Difference in the results of mutagenicity with or without S9 in the strains, were probably because of different kinds of created mutations. Essential oil had suitable antimutagenic activity with or without S9 in TA98. The mentioned properties of *Saturja sahandica* essential oil could make it a promising candidate for future applications.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



TRANSFORMATION OF SESAME (*SESAMUM INDICUM* L.) MEDIATED BY AGROBACTERIUM TUMEFACIENS

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Sesame (*Sesamum indicum* L.) is the oldest oil seed crop known to man and believed to have originated from South Western Africa, nicknamed as “Queen of oil crops”, owing to excellent oil stability due to the presence of natural antioxidants such as sesamol, sesamin, sesamol and α -tocopherol. Genetic improvement of sesame through conventional breeding methods is not rapid unlike other crops. Advances in tissue culture techniques offer an immense promise for sesame improvement yet it has remained unachievable. The successful application of these techniques depends on the callusing ability and regeneration of shoots; the former has been achieved by several workers while the latter, undeniably is considered to be a bottleneck. Beside The tools of genetic engineering via plant transformation offer a highly desirable approach for the genetic improvement of a plant genotype. We report here the successful transfer of T-DNA of *Agrobacterium tumefaciens* carrying the genes coding for β -glucuronidase (*uidA*), green fluorescent protein (*gfp*) and hygromycin phosphotransferase (*hpt*) to the nuclear genome of the Sesame (*Sesamum indicum* L. Var Naztakshakhe and Yekta). Stable integration of the transgene was confirmed by both PCR and histochemical assay. To investigate the effects of bacterial strains and different plant explants on the amount of gene transferring in two cultivars of Sesame, an experiment was conducted factorially in a completely randomized form and in five replications. Here the experimental factor are including the cultivar of Naze Takshakhe and Yekta, the type of cotyledon and hypocotyl and the Bacterial strain (GV3101, LBA4404) the result was indicating that in both cultivars, using cotyledon had better outcomes. In the interaction between the cultivar and the bacterial strain, also, in both cultivars, using LBA4404 bacteria has been a better decision, but there was not seen any significant difference between the two bacteria when we used in cotyledon explants. Amount the compound of the treatments, the maximum percent of gene transferring belong to Naz takshakheh cultivar, cotyledon explants and LBA4404 bacteria. The simplicity of *Agrobacterium*-mediated gene transfer and the high transformation frequency as well as the precision of T-DNA integration will enable further molecular dissection of this important model organism to understand basic plant metabolic processes as well as to exploit the system for biotechnological applications [1-4].

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MOLECULAR PHYLOGENY OF TRIBE BORAGINEAE (BORAGINACEAE S. STR.) BASED ON NRDNA ITS IN IRAN

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Boraginaceae s.str. (=subfamily Boraginoideae) comprises some 1600 species in approximately 100 genera and have their center of diversity in Eurasia. In Flore of Iran the family comprises of 41 genera and 218 species. The tribe *Boragineae* includes eight genera and 20 species in Iran, and being one of six tribes in the family. All the genera of this tribe have medicine effect such as *Borago officinalis* that is classified in this tribe. Because of their traditional medicinal and other important applications, many species of Boragineae have been studied with respect to their bioactive chemical compounds. 17 species of the tribe along two *Echiochilon* species plus *Heliotropium bacciferum* and *Tournefortia rubicunda* as out groups were include in a phylogenetic analysis using nrDNA ITS region. This region was amplified using appropriate primers by PCR and then PCR products were sequenced by the BigDye terminator cycle sequencing kit in an ABI Prism 3730xl DNA Analyzer. The sequences were aligned using Muscle program. The phylogenetic reconstruction was conducted using GTR+I+G evolutionary model and bayesian inference as implemented in mrbayes software. The analysis showed that *Boragineae* did not form a monophyletic group according to the highly supported relation of *Suchtelenia calycina* with *Heterocaryum* species which is classified within the tribe Eritrichieae, *Anchusa* is not a monophyletic group as well and its species are located into 2 separate clads. The analysis revealed that *Symphytum* and *Nonea* each separately formed a monophyletic group and are successive sisters to the other genus in the tribe namely *Phyllocara*, *Gastrocotyle*, *Hormuzakia*, *Anchusa* and *Borago* that are in a high supported clad together. *Echiochilon* whit two analyzed species positioned at the base of the tree as sister to the Boragineae clad.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF SOME PLANT GROWTH REGULATORS ON THE GROWTH AND ESSENTIAL OIL CONTENT OF CULTURED *SATUREJA KHUZISTANICA* JAMZAD PLANTLETS

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Satureja khuzistanica Jamzad is an important multipurpose medicinal plant in Iran. The essential oil of *S. khuzistanica* is characterized by high concentration of Carvacrol (93%). Micropropagation of *S. khuzistanica* through shoot-tips (1 cm) was achieved successfully on LS media. Micropropagated plantlets were cultured without plant regulators in the culture medium (control) or in media containing 0.5 to 5 μ M of 6-benzyladenine (BA) and combinations of indole-3-butyric acid (IBA: 2 and 5 μ M) with BAP (5 and 10 μ M). These plantlets were examined for their yield essential oil and composition in relation to growth rate and density of glandular hairs at six weeks of culture. The highest biomass shoot growth was obtained with BA at 5 μ M, while the higher frequency (77%) of shoot formation was observed in the media contained BAP (5 μ M) in combination with IBA (2 μ M). A positive correlation between the growth rates of these plantlets and essential oil content (0.6%–3.8% v/w) was observed and all **growth regulators** showed a positive correlation between oil accumulation and the percentage of glandular hairs. In response to growth regulators changed the amount of Carvacrol, therefore the effects of plant regulators on gene expression of 1-deoxy-d-xylulose 5-phosphate reductoisomerase (a key enzyme in a biosynthetic pathway for isoprenoids) is also discussed.

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INDUCED TAXOL PRODUCTION AND RELEASE BY ELICITATION IN A TWO-PHASE SUSPENSION CULTURE OF HAZEL (*CORYLUS AVELLANA*)

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Although the production of taxol by *Taxus* species is already a commercial reality is still not enough, so other natural sources of this compound are searched. Recently, a number of studies have shown hazel plant as a new source of taxol- (and related taxanes) among angiosperms [1, 2]. However, the production efficiency of taxol is low because of the inherent characteristics of plant cells. This prompts deep efforts to develop other methods for improved taxol production. Numerous strategies have been proposed for improving plant cell productivity and secondary metabolite production in suspension-cultured cells, including precursor and nutrient feeding, *in situ* extraction (two-phase culture), and treatment with elicitors. For this cell suspension cultures of hazel were challenged with salicylic acid (SA) concentrations and combination of SA and dibutyl phthalate (DBP). SA with concentrations of 12.5, 25 and 50 mg/L and DBP (10% (v/v)) were used. The results showed that on the growth curve basis, a couple of week was desired for subculturing and day 8 is a suitable time to apply treatments such as elicitation. The content of cell-associated and extracellular taxol increased gradually with time and reached values of 4.25 (μ g/g DW) and 22.25 (μ g/L) after a cultivation period of 2 weeks, respectively. The growth, viability and protein content of cells were decreased by the treatments, compared to that of the control culture. In all treatments, hydrogen peroxide content and lipid peroxidation rate of cells increased compared to those of the control cells. Activity of phenylalanine ammonia-lyase increased by SA and, DBP exaggerated effect of SA. While flavonoids content decreased by the treatments, taxol content increased significantly. The extracellular taxol was more affected, compared to cell-associated taxol and all treatments increased taxol release and specific yield compared to that of the control. The most production of taxol (3 mg/l), release to the medium (92.4%) and specific yield (275 μ g/g cell dry weight) were observed under effect of combined use of SA (50 mg/L) and DBP, respectively which suggesting a synergistic accumulative effect.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



INTERACTION OF DROUGHT STRESS AND MYCORRHIZAE INOCULATION ON FENNEL (*FOENICULUM VULGARE* MILL.) YIELD AND ESSENTIAL OIL CONTENTS

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Today, to reach sustainable agriculture use of low input cropping systems and innovation of modern approaches for resource utilization are very important. From this, symbiotic mycorrhizal fungus has the key roles in plant nutrients supply. Water shortage has been the one important limiting factor in cultivation of medicinal plants, e.g. fennel (*Foeniculum vulgare* Mill), in arid and semi-arid regions of the world, especially in Iran. Fennel production and utilization in pharmaceutical industries is growing in Yasouj. So, the objective of this study was to evaluate the interaction of mycorrhizae and drought stress on fennel yield and essential oil contents.

The experiment was carried out as split-plot based on completely randomized block design with four replications in Yasouj on 2011. The main plots were four levels of irrigation after 50, 100, 150 and 200 mm evaporation from class A pan and sub plots consisted of three levels of mycorrhizae inoculation as, control, inoculation by *Glomus intraadices* and *Glomus macrocarpum*.

Results showed that the highest seed (1337.9 kg ha⁻¹) and biological (12013.3 kg ha⁻¹) yield was belonged to the irrigation after 100 mm evaporation, but stress had no significant effect on harvest index. Phosphorous content was higher in the irrigation after 50 and 100 mm evaporation than the other irrigation levels. There was no significant effect of treatments for the percentage of seed essential oils, but with increasing stress intensity, essential oil percentage increased, 10.2% increment was seen from irrigation after 200 mm (3.014%) compared to irrigation after 50 mm (2.736%) evaporation. Maximum essential oil yield (40.0 kg ha⁻¹) was obtained from irrigation after 100 mm. There was no significant effect of treatments on 1000-seed weight, but this trait reduced by increasing stress. Effect of mycorrhizae on the measured traits was not significant, however inoculation with *Glomus macrocarpum* compared to without inoculation, increased seed yield, 1000-seed weight, seed phosphorus content, harvest index and essential oil yield, respectively by 1.6%, 4.03%, 8.5%, 6.6% and 5.6%. Biological yield (1.8%) and essential oil percent (4.1%) increased by inoculation of *Glomus intraadices* relative to non-inoculated treatments.

DETERMINATION OF MEDICINAL PLANTS IN IRAN

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Iran is located in south-west Asia and is a vast country with a total land mass of about 1,648,000 square kilometers. Because of variable climatic condition (Considerable variation of temperature, rainfall and edaphic conditions) has the most varied and most fascinating vegetation and naturally great diversity and richness in the plant life.

According to Floras; The first milestone in floristic research on South-west Asia and thus on Iran, Boissiers, "*Flora Orientalis*" (1867-1888). And today the most important basis for research in vegetation has been done specially by K.H. Rechinger the most well known botanist in Iran and his eternal "*Flora Iranica*" (1963-2007), and recent research have been done by Iranian botanists in Iran grows around 150 Spontaneous plant families, containing about 8000 species which of them around 2000 species are odorant and medicinal. Beside of them around 36 cultivated families grows in Iran.

During a careful research on the complete list of Iranian plant species and genera (spontaneous and exotic ones) which are listed in Dictionary of Iranian plants name "Mozaffarian" (1996). Out of an estimated 8000 higher plant species which comprising about 2200 species of spontaneous and exotic plants containing medicinal trees and shrubs (Fruits which used daily by people), Annual and perennial herbs and some introduced medicinal and nutrition plants used as food, spices and flavoring. Occurring in Iran about 400 species used in traditionally herbal medicine of Iran and here have been prepared a checklist from most common and well known medicinal plants together with spice and some by product of which used customary

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EVALUATION OF DIFFERENT TYPES OF *AGROBACTERIUM RHIZOGENES*, THE USE OF ARGININE AND MODIFICATION OF SALTS COMPOUNDS IN CO-CULTIVATION MEDIUM AND TYPE OF EXPLANTS ON THE TRANSFORMATION OF *PAPAVER BRACTEATUM* WITH *ROL* GENES

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Papaverbracteatum is a medicinal plant naturally distributed in the Alborz mountains north of Tehran and in the Iranian Kordestan. It has benzylisoquinoline alkaloids (such as thebaine, codeine, morphine, noscapine, papaverine). Genetic transformation by Ri T-DNA of *Agrobacterium rhizogenes* has been found to be an effective indirect way for accumulation of high secondary metabolites in plant cell. *rol* genes have a major *rol* in promotion of alkaloid production in transformed plant cells (1,2). Several factors affected on the rate of transformation in present study we evaluated different strains of *A. rhizogenes* (ATCC 15834 LBA 9402 A4 MSU440 and A13) and effect of 0,0.5,1,1.3,2mM arginine and low concentration of salts in co-cultivation medium. These modifications resulted in a significant improvement in transformation rate of *p.bracteatum* for transformation analysis plant genomic DNA was isolated from the hairy root samples using genomic plant DNA extraction kit (iNtron biotechnology Co). Lacking KH₂PO₄, NH₄NO₃, KNO₃, CaCl₂ play a major role to reach high frequent of transformation. Also we used different explants including leaves hypocotyls and excised shoots (i.e. with removing of the roots) for inoculation with *Agrobacterium*. Excised shoots explants were highly and significantly susceptible to infection by each strain of *A. rhizogenes*. The NDA was used in PCR analysis and southern blot for detection the existence of *A. rhizogenes rolB* gene. We found that adding arginine not only resulted in increasing the rate of transformation but also resulted in reduction of necrosis of explants

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**IDENTIFICATION OF INFLUENTIAL FACTORS ON UTILIZATION OF MEDICINAL PLANTS
(CASE STUDY: TEHRAN)**

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Substitution of chemical drugs by medicinal plants is considered as a major concern of medical societies, nowadays. Moreover, due to the side effects of chemical drugs on the human body functionality, the inclination of public toward the utilization of medicinal plants has been increased, recently. Plants and their medicinal faculties were a part of all ancient cultures. Used to cure illnesses, ward off evil spirits and sanctify rituals, plants which were discovered to have beneficial qualities were treasured by early societies. Commercially, the import of medicinal plants was reached from USD 355 million in 1976 to USD 10 billion in 2010 and is anticipated to exceed from USD 5000 billion in 2050 [1]. Iran is considered as one of the richest countries in terms of medicinal plants and their ecological variations as out of 7500 available plant species; about 10-15% is belonged to the medicinal plants [2]. According to the anthropological and historical studies, Iranian people were well familiar with the medicinal plants and their application to cure many illnesses. This study aimed to identify the influential factors on utilization of medicinal plants in city of Tehran by application of questionnaires and with the aid of regression model [3, 4]. Accordingly, some parameters such as price, consumer experience, awareness of the benefits of medicinal plants, availability, distance to the sales center, consumers age, education level, gender, marital status, monthly income, number of dependents and job description of consumers were considered as variables in this study. The results showed that 65% of the people of this city were aware of the benefits of medicinal plants and 38% of people utilize these plants in order to cure their maladies. Finally, the most influential factors in the consumption of medicinal plants were identified as price, consumer experience, and awareness of the benefits of medicinal plants, availability, age and gender of consumers in the city of Tehran.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



PREPARATION AND CHARACTERISATION OF PACLITAXEL LOADED HUMAN SERUM ALBUMIN (HSA) NANOPARTICLES

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Paclitaxel is an important anticancer drug in clinics for cancer therapy. Because of its low water solubility, it is formulated using Cremophor EL as a drug carrier which also induces hypersensitivity reaction [1]. In recent years nanoparticle technology was used as a versatile technique in drug delivery systems. It has many advantages for drug delivery including controllable release of drugs on target tissues; on the other hand nanoparticle within the size range 50-200 nm can circulate drugs in all bloodvessels [2].

In this article, Human Serum Albumin (HSA) was used as a suitable drug delivery system for paclitaxel as an anticancer drug. A desolvation method was used to convert HSA to nanoparticles and the drug was loaded during preparation method [2]. Paclitaxel loaded HSA nanoparticles were prepared in the size range 90 and 250 nm. Surface morphology of the loaded paclitaxel nanoparticle were investigated by scanning electron microscopy (SEM) and average particle size and size distribution by differential light scattering (DLS) technique. The paclitaxel loaded nanoparticles were examined for drug loading by high performance liquid chromatography (HPLC). SEM of pictures showed that nanoparticles were spherical and mono dispersed. Entrapment efficiency and drug loading were approximately 58% and 11%, respectively.

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STUDY ON FUNCTIONAL PROPERTIES OF USING DIFFERENT LEVELS OF BLACKSEED (*NIGELLA SATIVA*) IN THE DIET OF RAINBOW TROUT (*ONCORHYNCHUS MYKISS*) ON IMMUNOLOGICAL AND GROWTH INDICES

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Knowing functional properties of native plants is an important area in fish nutrition. One of purposes of using medicinal plants in the diet of animals is to improve growth indices and flesh quality. Blackseed is a plant having antibacterial agents. Blackseed was used at five inclusion levels (1, 2, 3, 4 and 5 %) together with control diet in the isonitrogenous and isoenergetic diets of adult rainbow trout (56.5±3.9 g) for 63 days. Immunological indices (lysozyme and complement) and growth performance (specific growth rate, %/day) were measured. Results showed that immunological indices including lysozyme and complement levels of the serum of fish fed the diet containing 5% blackseed increased (11.8 µg/ml and 14.3 unit/ml, respectively) significantly (P≤0.05) compared to control diet (9.2 µg/ml and 9.8 unit/ml, respectively). Using 5% blackseed increased the final weight (158.8 ± 4.8 g) compared to control group (138.6 ± 5.3 g). Specific growth rate fish fed the diets containing 5% of blackseed (2.5%/day) increased significantly (P≤0.05) compared to control diet (1.8%/day). Based on the results, using blackseed at 5% in the diet of rainbow trout was possible [1].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ANTIOXIDATIVE DEFENSE SYSTEMS AND TAXANE PRODUCTION IN SUSPENSION-CULTURED *CORYLLUS AVELLANA* CELLS INDUCED BY LOW-INTENSITY ULTRASOUND

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Low-intensity ultrasound is known as a physical elicitor with a variety of biological effects on the living cells. However, little information exists on the use of ultrasound to enhance biological processes [1]. The unique effect of ultrasound on secondary metabolites production in plant cell cultures is of both fundamental and applied significance. Taxol, an anticancer drug which is usually extracted from *Taxus* sp., has been isolated from *Coryllus avellana* cells as well [2,3]. This work aims to characterize activation of antioxidative defense systems and taxanes production in a rapidly growing cell line of *Coryllus avellana* cells induced by ultrasound. The cells were grown in LS media and were exposed to US at power density of 4 and 455 mW/ cm² for 4 to 40 min. The radical scavenging ability of the cells and the production of major taxanes i.e., Taxol, 10-deacetylbaccatin, and baccatin III were measured. The enzyme activities of superoxide dismutase, catalase, peroxydase and content of proline and fructane were evaluated. Total amounts of major taxanes i.e., Taxol, 10-deacetylbaccatin, and baccatin III increased to 4.8-, 3.8-, and 5-fold higher than those of the control cells by ultrasound at power density of 4 mW and to 6-, 5-, and 7-fold higher than controls by ultrasound at power density of 455 mW. A significant enhancement of the activities of superoxide dismutase, catalase, peroxydase are also observed. These results suggested that ultrasound enhanced antioxidation ability of the hazel cells comes from the enhancement of enzymatic and nonenzymatic preventive substances as observed in this study. Also the outstanding result was high biosynthesis of taxanes in hazel cells induced by ultrasound which are the most important medical substances.

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CYTOTOXIC ACTIVITY OF A NEW SPECIES OF *PTEROCARYA* LEAVES AND FRUITS FROM IRAN

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Cytotoxic activity is one of the most important properties of plant products. In vitro lethality in simple zoological organism, *Artemia salina* larvae, can be used as a convenient monitor of screening the plants for cytotoxic activity [1- 3]. This assay is a standard test to show toxicity in plant extracts. Lower lethality concentration shows higher toxicity. According to effects of this plant on fishes reported by local people in Guilan province and also scientific reports about its toxicity on chicken embryo [4], it will be interesting to know its effect on brine shrimp larvae. In this research work, toxic activity of methanol extract of fruits and leaves of *P. fraxinifolia* during phenological period, were evaluated against brine shrimp (*A. salina*) via Brine Shrimp Lethality Test (BSLT) method. Plant extracts were prepared via Soxhlet technique with methanol as solvent. Between different parts of the mentioned plant in phenology period, fruits exhibited significant higher activity with having LC₅₀ equal to 350 µg/mL.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



NAPHTHOQUINONE DERIVATIVES PRODUCTION USING CELL SUSPENSION CULTURE OF *ALKANNA ORIENTALIS*

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Alkanna orientalis (L.) Boiss. is a medicinal plant belonging to the family Boraginaceae. The roots of the plant are well-known in traditional medicine as a remedy for some complaints such as burns and wounds [1,2]. Based on previous reports, roots of various genera of Boraginaceae accumulate naphthoquinone pigments as bioactive compounds [3,4]. In this study, callus tissues were induced from cotyledon explants of *A. orientalis* on the solidified B5 medium supplemented with 2,4-dichlorophenoxyacetic acid (2,4-D) and kinetin at $25 \pm 2^\circ\text{C}$ in dark. Subsequently, an in vitro two-liquid-phase system suspension culture was established to elicit naphthoquinone pigments using liquid paraffin as absorbent. The n-hexane extract of proliferated cell suspension culture were evaluated by analytical HPLC. Afterwards, the main secondary metabolites were separated by preparative HPLC and their structures were elucidated by UV, ^1H and ^{13}C -NMR spectroscopy. On the basis of our results, the two-liquid-phase system suspension culture resulted effectively in induction of alkannin derivatives. These findings draw attention to the naphthoquinone production potential of the *A. orientalis* cell suspension culture, which may be considered as a source for production of these secondary metabolites for medicinal use.

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EVALUATION OF THE INHIBITORY EFFECT OF THREE PLANT CRUDE EXTRACTS AGAINST *ALBUGO CANDIDA*, THE CAUSAL AGENT OF WHITE RUST

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White rust, caused by *Albugo candida*, is the most destructive foliar diseases of persian cress, *Lepidium sativum* in Iran. Application of fungicide is the most common method for the disease control. However, regarding the problems created by synthetic pesticides application, environmentally safe methods are needed to replace chemical pesticides. In this study, the antifungal activity of plant natural extracts was investigated for their ability to control white rust in the field. After a preliminary test with more than 50 plant crude extracts, the crude extract of three selected plant species was obtained using methanol. The inhibitory effect of the extracts was examined by spraying the plant extracts and chemical fungicide (mancozeb) in three times (every 10 days) at concentration of 10000 ppm. To increase the chance of disease incidence, detached infected leaves collected from severe infected field were uniformly spread between and around the plots. The experiment was conducted in a randomized block design, with four replicates. Ten days after the last spraying, once the disease severity in the control plots was shown to be reliable, disease evaluation was conducted based on the number of spores per unit area. The results of the experiment showed that *Mespilus germanica* extract completely (100%) controlled disease caused by *A. candida* and no infection was observed in treated Persian cress with extract of *M. germanica* in the field.

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16, 17 May 2012
Kish Island



THE EFFECT OF SOME PLANT CRUDE EXTRACTS IN THE CONTROL OF CUCUMBER
POWDERY MILDEW

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Powdery mildew caused by *Podosphaera xanthii* and *Golovinomyces cichoracearum*, is one of the most destructive foliar diseases of cucumber. It has been found that *P. xanthii* is the main agent of this disease in Iran. Application of fungicide is the most effective method for the disease control. However, regarding the problems created by synthetic pesticides application, environmentally safe methods are needed to replace chemical pesticides or reduce their consumption in the ecosystem. Therefore, in this study, the antifungal activity of nine plant extracts was investigated against *P. xanthii*. These nine plant species were selected from a preliminary test with 24 plant species. The crude extract of these plants was obtained using methanol as a solvent. The extract (50 mg/ml) was sprayed on cucumber seedlings at the second true leaf stage. Twenty-four hours after spraying, the seedlings were inoculated with a conidial suspension at concentration of 1×10^4 spore/ml. The experiment was conducted as a completely randomized design, with four replicates. Twelve days after inoculation, the severity of powdery mildew was evaluated based on number of spores produced over the first true leaves of each plant per leaf area and number of spots per leaf area. The percentage of inhibition was calculated based on two mentioned characters. Six plant extracts including *Synzygium aromaticum* (with 87.46 % inhibition was the strongest), *Pinus eldarica*, *Ferulago angulata*, *Carum copticum*, *Celtis caucasica* and *Artimisia sieberi* showed non-significant difference in term of percentage of inhibition calculated based on number of spores per leaf area, but they significantly differed from *Allium heamanthoides*, *Rosmarinus officinalis* and *Hypericum perforatum* extracts. *Rosmarinus officinalis* extract was not significantly differ from the mentioned six plant species when the percentage of inhibition calculated based on the number of spots per leaf area. The extract of *Synzygium aromaticum* was the strongest extract (with 99.15% of inhibition) in term of number of spots per leaf area.

EFFECT OF L.E.D ON PLANT GROWTH AND ANTIOXIDANT PROPERTIES OF
THYME IN VITRO CONDITION

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Light spectral quality stimulates a variety of physiological, morphological and anatomical reactions in plants [1, 4]. In current research, influence of light-emitting diode (LED) on *in vitro* growth, antioxidant properties and essential oil content of *Thymus vulgaris* were studied. Single node explants were cultured on MS medium containing 1 μ M BA and 0.5 μ M IAA. The cultured explants were incubated in five different partitions of LED light spectrums (green, red, blue, sunlight; and an equal combination of red, blue and sunlight) each with light intensity of 35 μ mol s⁻¹m⁻². Same intensity cool white fluorescent lamps were used as control. Properties of thyme such as shoot length and number, internode length, and producing callus as well chlorophyll content, total poly phenol, antioxidant activity; and essential oil content were evaluated 8 weeks afterwards. Results showed that green LED increased etiolation behaviour in explants while decreased their survival period. Meanwhile, in other treatments, all explants survived and grew normally. The explants' height and internode length under red and blue LEDs increased and decreased; respectively. The lowest explants' height was measured in those treated with white cool florescent light. Besides, the highest yield was evaluated in explants treated by white cool florescent light, that did not have significant difference with the others. Chlorophyll content increased when explants were radiated by blue light or sunlight. However, the lowest chlorophyll content was measured in explants radiated with red LED. Red LED induced an increase in total polyphenol content and antioxidant activity. Of course, the lowest polyphenol content and antioxidant activity were measured in explants radiated by blue LED. There was no significant difference between treatments based on essential oil content. It can be concluded that, LED has a great potential to be regarded as a major light source in the growth chamber [2,3]. However, to optimize plant growth and development, it is necessary to find the best LED intensity and combination.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECTS OF DIFFERENT TREATMENTS ON MICROSPORE EMBRYOGENESIS IN *SATUREJA* *KHUZISTANICA* AND *SATUREJA RECHINGERI*

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Microspore culture is one of the most commonly used methods to produce doubled haploid plants. In this research, microspore embryogenesis of two valuable medicinal plants, *S. khuzistanica* and *S. rechingeri*, was studied. As the uni-cellular microspores are the most responsive, developmental stages of microspores were determined using acetocarmen staining and then the late uni-cellular microspores were collected in the right time for future works. The flowers were sterilized with ethanol (70 % for 3 minutes) and then sodium hypochlorite (3 % for 10 minutes). Isolation and induction media, sources of carbohydrate and stress are the most influencing factors on survival and formation of multi-cellular structures of microspores. Two different isolation media (AB and sucrose 13%) were tested and sucrose 13% media was used for future works as the difference was not significant. Microspores of both species were subjected to different treatments including three induction media (NLN-13, FHG, A2-60) and different pretreatments (carbon starvation, temperature treatments and various levels of 2, 4-D). The experiment was conducted as factorial based on CRD with three replications. Among induction media, multi-cellular structures were observed only in NLN-13 induction medium. Temperature treatment of 30 °C for 8 days and 2, 4-D treatment of 35 mg/l could induce multi-cellular structures in both species. However, other treatments didn't show any effects on formation of multi-cellular structures of microspores.

This is the first report of microspore culture of *S. khuzistanica* and *S. rechingeri*.

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STUDY OF COSTMARY AS AN IMPORTANT PHARMACEUTICAL PLANT, ITS REGENERATION AND ANALYSIS OF SOMACLONAL VARIATION WITH RAPD MARKERS IN TISSUE CULTURE

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Costmary (*Chrysanthemum balsamita* (L.) Baill. syn. *Tanacetum balsamita* L.) Asteraceae, is a large perennial plant of Asian origin with yellow flowers. It is one of the most important medicinal and aromatic plants of Azerbaijan provinces in Iran with the dominating constituents carvone and thujone [1]. This plant has been used for more than several centuries as flavor, carminative and cardiotoxic in traditional and folk medicine [2]. The objective of the present study is to establish an in-vitro shoot regeneration protocol for the calli derived from nodal parts of costmary in the MS medium and measuring somaclonal variation in the genomic DNA isolated from costmary petioles calli after first, second, third and fourth months of culture. For regeneration study we tested different combinations of growth regulators and realized that MS medium supplemented with (2 mg/L Kinetin + 0.1 mg/L NAA), and (2 mg/L BAP + 0.5 mg/L NAA) were the best hormone combinations for node explants. Ten RAPD primers were used to analyze genetic variation between callus samples of petiole. The results showed different amplification patterns between callus samples from different subcultures [3].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



AUTECOLOGY STUDY OF *KELUSSIA ODORATISSIMA* MOZAFF. AN ENDANGERED ETHNOMEDICINAL PLANT OF IRAN

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Kelussia odoratissima Mozaff. belonging to the *Apiaceae* family, is an Iranian endemic ethnomedicinal plant, which is highly endangered by severe harvesting and unsustainable herbal collection. In this research, autecological background of this species was studied in the wild habitats, to understand their conservation biology as well as to predict their behavior under artificial cultivation. The study area is located on the SW of the Iran, covering Charmahal-Bakhtiari and Isfahan. Site characteristics, including topography, climate, soil, accompanied plant species and essential oil percentage were determined. The study of habitats features indicated that this species grows in north-facing slopes up to 50% with altitudes of 2300 to 2900 m and mean annual precipitation ranging from 330 to 1440 mm and average annual temperature of 6 to 7 °C. This plant grows on loam and clay-silty soils with EC of 0.45 to 0.72 (ds/m), pH of 6 to 8 and medium in mineral content. Height of plants were varies from 140 to 310 cm with crown diameter of 20 to 160 cm. Canopy cover and frequency for this species were 32 and 35 %, respectively. Vegetative growth stage of this species started in late March and ends of vegetative growth in early June, and flowering stage is from early June until early July, and seed ripening in mid September. The whole growth period of this species is a nearly 180 days which are equivalent to 2308.4 GDD. Essential oils of the plant aerial parts, which were collected from four regions Samsami, Koohrang, Bazoft and Feriedanshahre, were yellow and yields were 0.26, 0.33, 0.34 and 0.32 % (w/w), respectively. Ecological characteristics of this species need to be considered in management programs of related rangeland ecosystems [1, 2].

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IN VITRO ANTILEISHMANIAL ACTIVITY OF *FERULA ASSA-FOETIDA* ETHANOL EXTRACTS AGAINST LEISHMANIA MAJOR PROMASTIGOTES STRAIN MRHO/IR/75/ER

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Leishmaniasis is a family of diseases caused by protozoan parasites of the genus *Leishmania*. Various *Leishmania* species can cause human infection, producing a spectrum of clinical manifestations. The current treatments are unsatisfactory, and in absence of a vaccine, there is an urgent need for effective drugs to replace/supplement those currently in use. Several anti-leishmanial drugs of choice are of plant origin. Many of the available drugs against the disease are toxic and in certain cases parasite drug resistance is developed [1]. The development of new compounds is urgently required. *Ferula assa-foetida* is an herbaceous wild plant native to Iran. In Iranian traditional medicine, *Ferula assa-foetida* gum extract has been used as a remedy for abdominal pain, constipation and diarrhea and as an antihelminthic. Although there is some evidence for the anticoagulant action, antiparasitic and hypotensive effects of *F. assafoetida* gum [2]. In this study, we want to determine the leishmanicidal activity of the ethanol *Ferula assa-foetida* extracts against *Leishmania major* in vitro. The leishmanicidal activity of ethanol extract of *Ferula assa-foetida* against *Leishmania major* free living promastigotes was evaluated, using microscopic examinations. Ethanol extract of *Ferula assa-foetida* highly effective against *Leishmania major* promastigotes (IC₅₀=2±0.12 microg/ml; ID₅₀=0.65±0.023 microg/ml; LD₅₀=2.1±0.096 microg/ml). The extract at 1.25 microg/ml totally eliminated the promastigotes 3 days of treatment. The present study suggests that ethanol *Ferula assa-foetida* extracts might be a potential source of anti-leishmanial compounds.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECTS OF TEMPERATURE REGIMES ON HORTICULTURAL TRAITS AND ESSENTIAL OILS OF FOUR COMMERCIAL CULTIVARS OF SWEET MARJORAM

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Marjoram or 'Sweet Marjoram' (*Origanum majorana* L. syn. *Majorana hortensis* Moench) is a herbaceous perennial plant native to Eastern Mediterranean [1]. Its aromatic and medicinal properties are related to the accumulation of essential oil in aerial parts [2]. In the present study phenotypic variations of four commercial marjoram cultivars cultivated in Germany were evaluated using quantitative horticultural traits, essential oil content and composition. A phytotrone experiment was conducted with four cultivars (Aegyptischer, Tetrata, Marcelka and Erfo) at three temperature regimes (day/night: 20/15°C, 25/15°C and 30/15°C). Agronomic traits such as plant height, fresh and dry weight and leaf fraction were investigated. Essential oil extracted from dry leaf by hydro-distillation was analysed by GC and GC-MS. Analysis of variance (ANOVA) was carried out for cultivars and temperature regimes. Additionally, Principal Component Analysis (PCA) was performed to obtain the genetic relationships among cultivars. The results showed that the cultivars of Marjoram significantly differed in all evaluated horticultural traits. In addition, for each cultivar, these traits strongly varied depending on growing temperature. The highest dry weight of leaf fraction, an important trait for marjoram breeding, obtained for Aegyptischer and optimal temperature regime for this trait for all tested cultivars was 25/15°C. The essential oil contents of the cultivars varied between 1.2% and 2.7% for Erfo and Aegyptischer, respectively. A positive effect of high day temperature on the production of essential oil was found only for cultivar Aegyptischer. In all cultivars, forty-four compounds were identified in the oils with a high variation in their percentage concentrations. The predominant constituents of the essential oils were *cis*-sabinene-hydrate (28.3-46.0%), *trans*-sabinene-hydrate (9.5-23.5%) and terpinene-4-ol (9.1%-15.1%). According to essential oil compositions, most dissimilarity was revealed between Tetrata and Aegyptischer. This was further confirmed by Principal Component Analysis. Considering the influence of growing temperature on the percentage concentrations of the major components, an interaction between temperature and cultivar was observed. All cultivars except Erfo produced high amount of *cis*-sabinene-hydrate with the 30/15°C temperature regime. In conclusion, our results show a growing temperature-dependent phenotypic plasticity in horticultural traits and essential oils of four commercial cultivars of marjoram.

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CHEMICAL COMPOSITION AND BIOLOGICAL ACTIVITIES OF *BIDENS BIPINNATA* L

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Bidens bipinnata L. is distributed in Northern regions of Iran and around Tehran. *Bidens* genus have some pharmacological activities. The aim of this study was to evaluate the antioxidant activities, phenol and flavonoid contents of methanol extract of *Bidens bipinnata*. The total antioxidant capacity was determined by the following methods: ABTS and DPPH free-radicals scavenging and ferric reducing/antioxidant power (FRAP). Hydrodistilled essential oil of the plant was analyzed by GC and GC/MS. Antimicrobial activities of the methanol extract and essential oil were also determined against three gram positive and three gram negative bacteria and three fungi. The extract possessed a higher concentration of total flavonoid than total phenol content. Methanol extract showed high DPPH scavenging activity with 50% inhibitory concentration value (IC₅₀) of 81.80 µg/ml (IC₅₀ <100 µg/ml). Thirty one constituents were found representing 91.89% of the essential oil. The main constituents of the essential oil were α-pinene, β-myrcene, Germacrene-D, Bicyclogermacrene, δ-Elemene, Spathulenol, trans-Ocimene and α-Humulene. The highest antimicrobial activities of the essential oil of *B. bipinnata* were against *Streptococcus pyogenes*, *Candida albicans* and *Saccharomyces cerevisiae* (MIC = 125 µg/ml). The present results demonstrate that *Bidens bipinnata* extract exhibits antioxidant activity and may serve as potential source of natural antioxidants for treatment of some diseases. Further investigations are necessary for chemical characterization of the active compounds and more comprehensive biological assays [1].

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THE EFFECTS OF *HYPERICUM PERFORATUM* ON WOUND REPAIR AND SCAR OF CAESAREAN

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The scar represents an abnormal, exaggerated healing response after skin injury and may cause pain, pruritus, contractures, hindrance to movement and other functional impairments. Current treatments of therapeutic approaches to scar management are associated with high rates of recurrence and can be expensive or painful. *Hypericum perforatum* has long been used for healing of wounds in the Iranian traditional medicine. Although it is used for purpose of wound healing but there is limited clinical research supporting this practice. Thus, the aim of this study was to determine the effects of *Hypericum perforatum* on wound healing and hypertrophic scar. This study was a randomized, double-blind clinical trial study. The study was conducted in Samen-Ol-Aemmeh (Pbuh) Hospital in Mashhad, Iran. The participants included 144 eligible women with caesarean childbirth. The participants were randomly assigned to 3 groups. The treatment and placebo groups applied *H. perforatum* or placebo ointment 3 times a day for 16 days based on consecutive coded ointments. The control group remained without any intervention postoperatively. Wound healing was assessed on the 10th day post caesarean using the REEDA scale (REEDA stands for redness, edema, ecchymosis, discharge, and approximation), which had criteria including redness, edema, ecchymosis, discharge, and approximation. On the 40th day, the degree of scarring was assessed using the Vancouver scar scale including pigmentation, height, pliability, and vascularity. The subjects were also asked some questions about pain by using the Visual Analogue Scale and pruritus of scar. The mean age of all the study subjects was 23.50 ± 4.03 and mean parity was 1.23 ± 48 . There were significant differences in wound healing on the 10th day ($p < .005$) and scar formation on the 40th day post partum ($p < .0001$) between treatment group with placebo and control groups. However, the placebo group had no differences in wound healing ($p < .93$) and scar formation ($p < .11$) with the control group. In addition, significantly lower pain and pruritus were reported by the treatment group compared with the placebo and control groups on the 40th day post-partum. Topical application of *H. perforatum* is safe and can facilitate caesarean wound healing and minimize formation of scar and its pain and pruritus.

THE EFFECT OF CROCIN ON CYCLIN D1 EXPRESSION IN NMU-INDUCED BREAST CANCER IN FEMALE RATS

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Saffron stigma, contain some chemical substances such as crocin that shows the beneficial effects against some diseases. Crocin is unusual, in that it is water soluble carotenoid as a consequence of their glycosylated state, so it is easy to administer. Thus it appears to be an appropriate component of saffron for evaluation as potential anticancer agents. On the other hand breast cancer is the second leading cause of cancer related death among women and about 70% of these cancers are estrogen-dependent for growth. Induction of mammary tumors following the administration of NMU in rat is a preferred model of breast cancer induction in the experimental animals for investigating of breast cancer in women. Cyclin D1 in G1 phase plays a key role in the initiation and progression of this phase. Its overexpression has been reported between 40 and 90% cases of invasive breast cancer. Thus, in the present research, the effect of crocin on cyclin D1 expression in NMU-induced breast cancer in female rats are reported. At first, purification of crocin from saffron was performed. Then, breast cancer was induced by intraperitoneal injection of NMU (50 mg/kg bw) at different ages of rats. The animals were weekly weighed and palpated in order to record the number, location and size of tumors. After appearance of tumors and its suitable size (1.5 cm), treatment was began by i.p. injection of effective dose of crocin. Then all mammary tumors and normal mammary glands of the control group were dissected and immediately frozen in liquid nitrogen and stored at -70 for RT-PCR and western blot analysis. The results showed the beneficial effect of crocin on cancer treatment, in order to decrease the volume of tumors and cyclin D1 expression in RT-PCR and western blot analysis.



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EFFECTS OF BETAFIN AND *SILYBUM MARIANUM* EXTRACT ON GROWTH RATE, SURVIVAL AND SOME HEMATOLOGICAL FACTORS OF *ONCORHYNCHUS MYKISS*

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The protective effects of Betafin and *Silybum marianum* extract against mammalian hepatic injuries, has been frequently reported. On the other hand hepatic injury, particularly fatty liver is one of the most common health problems in rainbow trout farms in Iran. Therefore the effect of Betafin and Silimarin on some growth index, hematological parameters and serum enzymes were investigated. 540 rainbow trout mean weight 35 ± 2 were randomly divided into 3 groups in triplicate (Betafin, Silimarine and Control). Betafin and Silimarine were mixed and homogenized in standard diet and the fish were fed with experimental diets for 60 days. Fish weight and length recorded in initial middle and end of study. Consumed feed in each group were recorded too. Growth indexes were calculated in each group and blood samples were taken from 6 fish per each treatment for hematological and serum enzyme assay. Hematological parameters, Red blood cell count (RBC), White blood cell count (WBC), Hemoglobin (Hb), Hematocrit (PCV) and globular indexes (MCV, MCH and MCHC), and serum enzymes, ALT, AST and ALP were measured. Then fish dissected and hepatosomatic index (HSI) calculated. Results showed that Betafin significantly ($P < 0.05$) improved growth indexes including Specific growth rate (SGR), Food conversion rate (FCR), Protein efficacy rate (PER) and Daily growth rate (DGR). But no significant changes induced in Survival rate and Coefficient factor (CF) among three groups ($P \geq 0.05$). Silimarine just improved SGR compare to control. RBC, Hb, PCV and globular indexes Showed no significant differences among three groups ($P \geq 0.05$), nevertheless WBC increased in Silimarine and Betafin groups compare to control ($P < 0.05$). AST and ALT (Not ALP) decreased significantly in Betafin and Silimarine groups. GSI decreased in Silimarine group compare to others ($P < 0.05$). According to this study it can be concluded that Betafin can help fish by growth stimulation and hepatoprotective effect, whereas Silimarine mostly improved hepatic efficacy in fish.

MICROPROPAGATION OF *THYMUS PERSICUS* (RONNIGER EX RECH. F.) JALAS-AN
ENDANGERED MEDICINAL PLANT FROM IRAN

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Thymus persicus, as a rich source of ursolic acid (UA), is a valuable and endangered medicinal plant which grows as an endemic species in the North West of Iran. The anti-inflammatory, anti-hyperlipidemic and hepatoprotective activity of UA, a pentacyclic teriterpene compound, has previously been reported. The plant has low propagation rate in nature; therefore, identification of a suitable system for *in vitro* propagation is needed. The aim of present study was to identify a suitable system for regeneration of *T. persicus* via direct organogenesis. Plant regeneration was tested on Murashige and Skoog (MS) medium supplemented with different hormonal regimes. *In vitro*-grown shoot tips of the plant were exposed to cytokinins 6-benzylaminopurine (BAP), kinetin (Kn), and thidiazuron (TDZ) alone or in combination with auxins α -naphthalene acetic acid (NAA), 2,4-Dichlorophenoxyacetic acid (2,4-D), Indole-3-butyric acid (IBA) and indole-3-acetic acid (IAA). The highest shoot formation (13 ± 2.6) occurred from cultured on medium fortified with 2 mg/L BAP plus 0.5 mg/L NAA. Rooting of elongated shoots was performed on MS and Gamborg B5 media supplemented with different concentrations of IBA and NAA. Regenerated shoots were easily rooted on different tested media, but more abundant (25 ± 1.7) and stronger roots occurred on B5 medium containing 0.5 mg/L IBA. The rooted plantlets were successfully acclimatized in the greenhouse and then transferred into natural conditions. Homogeneity of the *in vitro* raised plantlets was confirmed by random amplification of polymorphic DNA (RAPD) profiles.

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METHANOLIC EXTRACT FROM *ACHILLEA ERIOPHORA* L. LEAVES INDUCES CELL MIGRATION AND PROLIFERATION IN HUMAN FIBROBLASTS

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Achillea eriophora L., a member of the Asteraceae family, is a perennial herb with 30–60 cm erect stem; tomentose leaves up to 10 cm; and compact capitule with ligulate yellowish flowers. It is an endemic species in Khorassan province of Iran [1]. Different species of *Achillea* have been used in folk medicine against several disturbances including skin inflammations, spasmodic and gastrointestinal disorders, and hepato-biliary complaints [2]. Proliferation and migration of fibroblast cells have a basic function in wound healing process. In this study the effects of methanolic extract from the leaves of *A. eriophora* on the migration and proliferation of the cells were evaluated.

Shade-dried leaves were subjected to extraction by absolute methanol (1:20 W/V) using maceration method at room temperature. Total phenol and flavonoid content in crude extract were measured by spectrophotometry [3]. The extract was evaporated under vacuum and the remaining powder was dissolved in DMSO and diluted in Dulbecco's Modified Eagle's Medium (DMEM) for preparation of various concentrations. Cytotoxic effects of the extract were assessed by MTT assay. The proliferation of human fibroblast cells (HFF3) was monitored by a calorimetric method, and migration was assessed by the closure of a denuded area scratched in confluent monolayer cells [4]. Total phenolic contents were estimated as 1050.829 mg of gallic acid equivalents (GAE)/100 g of leaf dry weight and flavonoid contents as 216.56 mg of quercetin equivalents (QE)/100 g of leaf dry weight. Proliferation and migration of HFF3 cells were stimulated by low (0.1–0.8 µg/ml) and intermediate concentrations (1–30 µg/ml) of the extract, respectively.

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EFFECT OF DRIED HYDROALCOHOLIC *TRIGONELLA FOENUM-GRÆCUM* EXTRACT ON INSULIN RESISTANCE AND CARDIOVASCULAR RISK FACTORS IN METABOLIC SYNDROME PATIENTS

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Metabolic Syndrome is a set of risk factors that lead to diabetes, cardiovascular diseases and if not treated cause death because of these conditions. Metabolic Syndrome has a direct relation with Insulin Resistance and lipid metabolism disorders that is a background for cardiovascular diseases. In time treatment of risk factors can play an important role in prevention of cardiovascular diseases. Considering the health benefits of *Trigonella foenum-graecum* the purpose of this study was investigation the effect of dried hydroalcoholic *Trigonella foenum-graecum* extract on insulin resistance and risk factors of cardiovascular disease in patients with metabolic syndrome. Methods: Study was conducted as a double-blind clinical trial on 50 patients with metabolic syndrome. Patients divided in two groups randomly, treatment group which receive 2 capsules that contain 500 mg *Trigonella foenum-graecum* dried extract and control group that receive placebo for 3 months. Evaluation of diet, anthropometrical, biochemical, systolic and diastolic measurements were investigated, laboratory biochemical's like fasting insulin, total cholesterol, triglyceride, LDL-C, HDL-C, hs-CRP and IL-6 after 12 hour fasting were measured, for statistical analyses use pair t-test chi square test and ANOVA regard to variant type. Results: Comparison two groups in end of study shows that *Trigonella foenum-graecum* extract reduced significantly total cholesterol, insulin resistance, systolic blood pressure, IL-6 and hs-CRP in treatment group compare to control. But no significance change was seen on weight, waist circumference, and diastolic blood pressure, Triglyceride, LDL-C and HDL-C. Conclusion: use of dried hydroalcoholic *Trigonella foenum-graecum* extract can be effective in reducing some of cardiovascular risk factors in patients with metabolic syndrome without significant effect on anthropometric indexes.



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**DEVELOPING THE QUALITY OF SAFFRON PACKING TO GLOBAL MARKETS BY KANSEI
ENGINEERING**

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Now days, the world business is based on the competition. In this regard, the use of more efficient methods and tools has been the center of attraction. Packing is one of the effective measures in the process of selling products to count. Iran enjoys favorable climate conditions; therefore, it can produce many crops such as saffron and it also is the biggest producer of it in the world. But due to lack of proper facilities for packaging, the license of direct exports of the product is lost. As Kansei is a customer-oriented methodology, is used in many countries as a proven and efficient method. Kansei engineering techniques help to transform the customer's interests to the product design with considering the views of the consumer needs, they are also able to analyze the impercise of fuzzy data. They can provide good features of product and create a plan of them. In addition to considering basic need of consumer and satisfied them, they will increase sale. In this study, based on combination of Kansei methodology, Quality Function Deployment (QFD) and Analytical Hierarchy Process (AHP), the researcher have tried their based to present the analyses of the hierarchical design of the optimal package of saffron, which should be able to sell the product to market needs of European countries and a major part of the capital loss annually. This makes more productive employment, enhancement of component of performance and effectiveness. At the end, it will help Iran to achieve the true place in international trade.

**COLLECTION, EVALUATION AND SUSTAINABLE USE OF MEDICINAL PLANTS GENETIC
RESOURCE**

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Collection, identification and preservation of medicinal plant seeds is one of the most important research priorities that should be studied. In this research, major medicinal plant seeds were collected and identified from natural vegetation area in various parts of country over 10 years (2001-2011). In the first step, the list of important medicinal plant species were prepared using flora books and literature cited. Then, each province was divided into different ecological regions for better management of accessions collection. During the investigation, the seed's name and their identifications and some ecological factors of the originated area were registered e.g. elevation, slope, aspect and also major dominant specie (s) growing in the area. Afterwards, filed surveys were accomplished and all of collected seeds were identified, cleaned, packed and transferred to the seed technology laboratory in natural resource gene bank in Research Institute of Forests and Rangelands, Tehran, Iran. The accessions were analyzed for seed purity, humidity amount, vitality percentage and 1000 seeds weight. In this project, over 17000 medicinal plant accessions were collected and identified. The accessions were packed and stored in base cold store (-18°C) and active cold store (4°C). The accessions was belongs to 860 species, 339 genera and 76 families. The families of Labiatae, Compositae and Umbelliferae with 16, 13 and 11% were ranked as the first to third order, respectively. The genera, *Salvia*, *Plantago*, *Achillea*, *Rumex*, *Hypericum*, *Ferula*, *Melilotus*, *Artemisia*, *Cichorium*, *Heraclium*, *Plantago*, *Peganum*, *Dorema*, *Marrubium*, *Hypericum*, *Amygdalus*, *Teucrium* and *Sanguisorba* had higher frequency. Results of seed technology showed, that 81% of accessions had over than 50% germination. It was suggested that the 19% had more and less seed dormancy. The majority of species were wild and over than 70% were occurred in mountain ranges, in areas having altitude 1500 to 3000m. Up to now, 9800 accessions were evaluated by national universities and research centers. In this paper some challenges dealing with seed collection and maintenance will be discussed and some methodologies for *In situ* conservation of medicinal plants in area with higher diversity, cultivation and domestication of medicinal plants, multiplication and cultivation of endangered and endemic species in their main vegetation area, breeding for improved new medicinal varieties and seed technology will be discussed.



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16, 17 May 2012
Kish Island



PHYSICOCHEMICAL QUALITY CONTROL OF SENNA PRODUCTS FROM IRANIAN PHYTOPHARMACEUTICS

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There is an increasing attention to and usage of herbal drugs around the world. Medicinal products containing senna herb are very popular herbal remedies. In order to assess the quality of Iranian herbal products, as a part of national effort to achieve profile of quality of pharmaceuticals, this study was designed to evaluate the quality of products containing senna herb. Samples were purchased directly from drugstores in Tehran in 2002. The comparative study was conducted according to pharmacopoeial procedures. Also Iranian products were compared to appropriate foreign known-brands. Some defects were observed in Iranian products in respects to uniformity of contents and weights, and even content of the dosage forms. But in total, most of the products were found to be acceptable and at appropriate quality.

ANTI INFLAMMATORY HERBS IN THE TREATMENT OF ARTHRITIS AND OSTEOARTHRITIS

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With the growing interest in herbal therapies among persons with rheumatoid arthritis (RA). There exists a need to examine the evidence for the use of herbal medicines for RA. *Boswellia serrata* shows anti inflammatory activity which is mainly attributed to a component in the resin containing β - boswellic acid. A pair of placebo – controlled trials involving a total of 81 patients with RA found significant reductions in swelling and pain over the course of 3 months. The herb devil's claw may be beneficial in rheumatoid arthritis. One double – blind study followed 89 patients with RA for 2months. The group given devil's claw showed a significant decrease in pain intensity and an improvement in mobility. Ginger, curcuma and other herbal plants will be discussed.

TO BE A SUCCESSFUL ECOLOGICAL CHEMIST AND PHARMACOGNOSIST ONE SHOULD BE A SKILLED PHYTOCHEMIST

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Plants derive natural products to defend themselves against herbivore's attack, micro-organisms contamination and also synthesize allelochemicals to inhibit the growth of other competing plants. Ecological chemists perform appropriate bioassays to prove the ecological roles of natural products in the above iterations. In addition, they need to know how to purify and identify the active metabolites in a blend of hundreds and thousands natural products. The main task of phytochemists is also isolation and structural elucidation of natural products, therefore they must know very well analytical methods such as chromatography and spectroscopy. To perform this, they should also know the principle of biosynthetic pathways of natural compounds and be familiar with different common structures of secondary metabolites. On the other hand, pharmacognosists use different bioassays to select medicinal plants for isolation of bioactive natural products and apply them for drug development. To achieve these goal pharmacognosists must also know how to extract plant material and isolate and identify plant's metabolites. As a natural products chemist, I have experienced the above three branches of science and will describe how to isolate new natural products with biological functions and ecological role in some terrestrial plants.



INVESTIGATION OF THE EFFECT OF GINGER ON THE LIPID LEVEL

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Use of medical plants as a pharmacologic modality in prevention alternation in lipid metabolism has received wide attention from several workers. The lipid lowering effect of ginger was evaluated in this study.

This study is a randomized control trial that were performed on patients with hyperlipidemia. Exclusions were diabetes mellitus, hypothyroidism, alcohol, pregnancy and peptic ulcer. Patients were randomized to received ginger capsule (3gr/day in 3 divided dose) for 45 days. Lipid profile concentrations before and after treatment are measured by enzymatic assay and with demographic information analyzed by SPSS 10 and fisher's exact, paired t Test, t test and Mann-withney.

There was significant reduce in triglyceride, cholesterol, LDL, VLDL, concentrations of both groups ($p < 0.05$). Mean changes in triglyceride and cholesterol concentrations of ginger group are significantly higher than placebo group ($p < 0.05$). Mean changes in LDL and HDL and HDL concentrations of ginger group are higher than placebo group but in VLDL concentrations of placebo are higher than ginger so there were no significant difference ($p > 0.05$).

Results show that ginger has cholesterol and triglyceride lowering effect compared to placebo but no effect on others parameter.

ANTIMICROBIAL CHARACTERISTICS OF SOME HERBAL OILS ON *PSEUDOMONAS AERUGINOSA*

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Pseudomonas aeruginosa, an opportunistic pathogen that produces a number of unique virulence factors causes severe and life-threatening infections. In this study the effects of sub-minimal inhibitory concentrations (sub-MICs) of some essential oils on virulence factors of *Pseudomonas aeruginosa* such as alginate production, biofilm formation, swimming, twitching and adhesion were evaluated. MIC of *Zataria multiflora*, *Myrtus communis*, *Eucalyptus camaldulensis*, *Mentha spicata* and *Cuminum cyminum* essential oils on mucoid *P. aeruginosa* 8821M were determined by macrodilution method. Alginate production, biofilm formation, swimming, twitching and adhesion in the present of sub-MICs (1/2, 1/4 and 1/8 MIC) of essential oils were determined. GC-MS analysis led to identification of 32, 21, 22, 15 and 32 components in *Myrtus communis*, *Eucalyptus camaldulensis*, *Zataria multiflora*, *Mentha spicata* and *Cuminum cyminum* oils respectively. The MICs of essential oils against *P. aeruginosa* for *Z. multiflora*, *M. communis*, *E. camaldulensis*, *M. spicata* and *C. cyminum* oils were obtained 64, 64, 64, 16 and 32 $\mu\text{g/ml}$ respectively.

The results show that all oils at 1/2 and 1/4 MICs were significantly reduced all tested virulence factors. At 1/8 MICs, *Z. multiflora* oil had significantly reduced all virulence factors, but another oils had different effects. This study showed that sub-MIC levels of *Z. multiflora*, *M. communis*, *E. camaldulensis*, *M. spicata* and *C. cyminum* essential oils affected alginate production, biofilm formation, swimming, twitching and adhesion in *P. aeruginosa* and it is probable to use of these medicinal plants for treating.

APPLICATION OF "OMICS" TECHNOLOGIES IN PLANT RESEARCHES; MASS SPECTROMETRY POINT OF VIEW

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Nowadays, metabolomics, proteomics and genomics are important issues in plants researches. The evaluation and identification of metabolites in the natural specimens could be achieved using Gas Chromatography-Mass Spectrometry (GC-MS) and Liquid Chromatography-Mass Spectrometry (LC-MS) methods. Moreover, the plant proteins sequencing would be studied by electrospray and Matrix Assisted Laser Desorption Ionization mass spectrometry (MALDI)- Mass spectrometry (MALDI-MS). In addition the variations and expressions of plants DNA and RNA easily can follow by Mass Spectrometry instrument. Finally, the distribution of metabolites and peptides can be monitored by Imaging Mass Spectrometry (IMS).

Nanotechnologies have increased the nanomaterial applications in the several fields of life like agriculture as an agent to prevention or treatment of diseases. Knowledge of plant responsiveness to the environmental stresses can be obtained by determining the proteome variations and metabolite distribution within the tissues, organs or cells. Understanding the influence of nanoparticles (NPs) on metabolites, proteins and gens of plant can be only performed by MS instruments. Nevertheless, the most significant problems are missing the molecule's natural conditions of signaling responsiveness and interactions with other molecules over the sample preparation. This study will focus to show the ability of MS to provide outstanding point of view into the molecular analysis of plants according to the better resolution data about metabolites and proteins and quantitative variations during the plant development or environmental stresses.



COMPARISON OF THE EFFECT OF *ANETHOM GRAVEOLENS* AND DICLOFENAC ON CLINICAL SYMPTOMS IN PATIENTS WITH KNEE OSTEOARTHRITIS: A RANDOMIZED, DOUBLE-BLIND, CONTROLLED TRIAL

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Knee osteoarthritis is the most common joint disease in humans. The main treatment is pain relief and minimizes the limitations of physical function. The most important drug class which is used to treat this disorder is NSAID, but their side effects are important and common. Based on this issue using drugs with local effects have been considered. Given the history of Iranian traditional medicine reasonable solution is to find new drugs in Iranian Traditional medicine resources. Thus, by referring to authoritative sources of traditional medicine, we achieved a new pharmaceutical formulation.

Before Randomized clinical trial, we evaluated the anti inflammatory effect of this drug in rat, then its skin irritation and dermatotoxicity on rabbits and mice evaluated. A double-blind randomized clinical trial was performed on 82 patients aged 40-80 years old referring to clinic of rheumatology of Mustafa Khomeini Hospital. The patients received the drug (Shebet oil) or diclofenac gel three times a day for a total of four weeks. Completed the WOMAC questionnaire and global patient assessment form for the patients at weeks 0, 2 and 4 weeks. Serum level of laboratory variables was compared between the two groups before and after intervention. The dose of acetaminophen during the study was measured.

Based on Man Whitney U. test, Shebet oil group had significantly less pain in comparison with diclofenac group ($P < 0.05$). Knee stiffness, physical function Improvement, Questionnaire total score in second and fourth week in comparison with diclofenac gel were significant ($P < 0.05$). The dose of acetaminophen during the study significantly had become higher in the diclofenac group. ($P = 0.012$). Our study showed the analgesic and anti inflammation effects of the Shebet oil. According to lack of the skin irritation and dermatotoxicity of the shebet oil it can provide effective treatment for osteoarthritis in comparison with diclofenac gel.

IRANIAN SALVIA SPECIES AS A SOURCE OF RARE TRITERPENOID AND SESTERTERPENOID

Mahdi Moridi Farimani

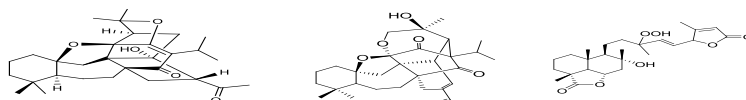
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The genus *Salvia* is a rich source of structurally diverse terpenoids. One of the most distinguishing features of *Salvia* species is their ability to synthesize isoprenoids with unusual scaffolds. In our recent works, we isolated three novel triterpenoids with unprecedented skeletons from the aerial parts of *Salvia hydrangea* [1, 2]. Triterpenoids with these carbon skeletons are rare in the nature and have been previously reported only from two other species; *Salvia bucharica* and *Perovskia abrotanoides*. It is interesting to note that all three species belong to the flora of Iran and the genus *Perovskia* is closely related to the genus *Salvia*. One of these compounds showed very good *in vitro* antiplasmodial activity at submicromolar concentrations and good selectivity. Its drug like physicochemical properties warrant preliminary *in vivo* testing for exploration of the compound's potential for further investigation. A plausible biogenetic pathway toward these new skeletons was also proposed.

Salvia is also unusual, as it is the only genus in the *Lamiaceae* that produces sesterterpenes. In contrast to di- and triterpenoids, sesterterpenoids are rare in nature and have been reported most commonly in marine sponges and algae. Among *Salvia* species, these rare and interesting compounds were isolated and identified for the first time from Iranian species, and this prompted us to undertake a systematic phytochemical investigation of members of this genus [3]. To the best of our knowledge, sesterterpenoids have been isolated from only nine *Salvia* species. It is interesting to note that seven of these species belong to the flora of Iran and three of them are endemic. Therefore, Iranian *Salvia* species might contain sesterterpenoids as main constituents, a fact that could be of chemotaxonomic importance.



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EFFECTS OF ORGANIC FERTILIZERS ON ESSENTIAL OIL CONTENT AND COMPOSITION OF SOME AROMATIC PLANTS

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Intensive agriculture with high chemical fertilizers application, will guarantee great yield but it will do at great expense along with environmental pollution. One of general aims of sustainable agriculture is environmental stewardship. Application of organic fertilizers and avoid or decrease chemical inputs are all considering towards this aim. Medicinal plants may be suited to production in organic systems. Plant growth promoting rhizobacteria (PGPR) are beneficial soil microorganisms that result in higher nutrient uptake, nitrogen fixation, adverse factors resistance, fertility, and improved soil structure. Both *Azotobacter* and *Azospirillum* are the most important genera of free-living rhizobacteria involved in nitrogen fixation. *Pseudomonas* is also one of genera of plant growth promoting bacteria. *Azolla* is a genus of aquatic ferns which floats on the surface of water. *Azolla* and its compost are been used as bio-fertilizer in arable lands. Zeolite as a modifier of agricultural land is another fertilizer. Literature review showed using biofertilizers affect on chemical components of medicinal plants. In this lecture the effects of some biofertilizers on essential oil content and composition of some Iranian aromatic plants will be presented. *Dracocephalum moldavica* L. belongs to the Lamiaceae family that widely used in pharmaceutical, cosmetic, perfume, food and flavoring industries. A field experiment was conducted in tow locations in Iran to investigate the effect of five fertilization regime (F1: 100% urea, F2: 75% urea + 25% Azocompost, F3: 50% urea + 50% Azocompost, F4: 25% urea + 75% Azocompost and F5: 100% Azocompost on oil content and composition of the two genotypes of dragonhead. Results showed that, F1 and F3 improved dry herbage yield in both genotypes in Tehran province, significantly. Moreover, the highest amount of essential oil was obtained by application of F3 treatment in G1 and G2 genotypes in both sites, respectively. Use of F3 treatment increased amount of geraniol and geranial in G1 and G2 genotypes in both sites. *Tanacetum parthenium* L. is one of the most important medicinal and aromatic plants. The effects of fertilizers, nitrogen and phosphor and bovine organic fertilizers on essential oil content and composition of feverfew was investigated. The results showed that bovine fertilizer had effects on oil percentage and yield, camphor, camphene and santolina triene percentage at level of 5%. The effects of zeolite, bio and organic fertilizers on essential oil content and yield of *Matricaria chamomilla*, was studied. Results showed the highest essential oil yield were obtained with PGPR inoculums. Zeolite and vermicompost also showed significant effects on the mentioned traits. Anise (*Pimpinella anisum* L.) is one of the aromatic plants used in medicinal and food industries. The effect of vermicompost, mixture of *Azotobacter*, *Azospirillum* and *Pseudomonas* and zeolite on essential oil content and composition of this plant was studied. The results showed that vermicompost application, Inoculating seeds with PGPR and zeolite application, improved essential oil content and yield, anethol and methyl chavicol percentage.

CULTIVATION AND UTILIZATION OF *THYMUS* SPECIES IN DRY LAND FARMING

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Medicinal plants in natural habitat due to adaptability in non-irrigated condition could be the suite option for cultivation and utilization in dry farming system. *Thymus* species distributed in some natural habitats, around the dry lands of Iran, which could be introduces as a cover green and economic yield in the slopes. Due to this, some *Thymus* species evaluated in North Khorasan, Gilan, East Azarbayjan, kordestan, Kermanshah, Lorestan, Esfahan and Tehran (Damavand) provinces under a split plots in 2007-2011. The results showed a considerable adaptability, growth and production of all domestic species in dry farming. The highest means of top with 1777 Kg/ha produced in *Thymus kotschyanus* from Kordestan, essential oil with 2.47% in *T. daenensis* from Esfahan and essential oil yield with 35.5 Kg/ha in *T. pubescens* from Kordestan provinces. High density in Kordestan and Tehran with producing high top yield and essential oil showed the considerable potential production of *Thymus* species in dry land of these regions. In addition, better quantity and quality of the domestic species than the foreign, was clear in all provinces unless North Khorasan. The suitable provinces for dry farming of *Thymus* species were Kordestan, Tehran (Damavand) and Kermanshah respectively. Finally, the results showed the similarity of well growing of *Thymus* species in natural habitats and dry land farming of each region.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



**ABSTRACTS OF
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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



NATIONAL PLAN FOR IRAN INDUSTRIAL & MEDICINAL PLANT MAPPING

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Due to great variation in Iran's climate and ecological niches, it can be recognized many diverse in medicinal and industrial plants species. There are five major ecological regions in Iran which involved subdirectories. These diversities have caused to grow different species of plants varieties. In spite of this capacity, main harvestings in ranges for industrial and medicinal purpose are traditional. Lack of the base information about distribution and ecological condition in the nature is one of the main and important reasons to advise the ways to establish and produce these species. In this plan the base ecological information which has collect through " Ecological Regions of Iran plan" will analyzed and convert to providence maps. Mapping will perform using 1:50000 maps transferred to 1:250000 and through GIS techniques convert to digital data for analyze. By These maps, planner and programmer in country, regions and providences can manipulate their duties on studying, planting, schematizing on medicinal plants in Sophisticated. Within our research we plan on investigating, recognition and introduction the capability of regions to produce these plants contemporary to employment management for industrial production of medical material.

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TAXONOMIC STUDY OF *THYMUS ERIOCALYX* (RONNIGER) JALAS IN IRAN WITH EMPHASIS ON FLORISTIC MARKER AND USING OF DETERMINATION OF SPECIAL STATION METHOD

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Thymus L. is one of the largest genera of Lamiaceae family. This species have commercial value due to containing of essential oils and wide application in food and pharmaceutical industries. From this genus, 18 species have been identified in Iran. Because of Gene flow potentiality among population, the high diversity of morphologically exists among population. *Thymus eriocalyx* (Ronniger) J alas is one of the species of this genus that only is distributed in west of Iran and north of Iraq. To determine intraspecific variations in *Th. eriocalyx* from taxonomic point of view and effective ecological factor, data were collected using special station method. In this way, ten special stations were recognized for *Th. eriocalyx* in west of Iran. Results from floristic data (Floristic composition of each special station) analysis with MVSP software by PCO method, led to identification of 6 separate groups that was indicative of existence of intraspecific diversity. Morphometric data analysis of individual collected from each special station, by using 33 vegetative and reproductive characters, with PCO and UPGMA methods, confirmed 5 mentioned floristic groups. Ecologic data analysis with CCA Method showed that various ecological factors is effective in groupment and formation of special stations diversity, that among studied factors, altitudinal, soil texture and permeability and slop direction factor were effective in groupment of special stations. On this base, at least 3 ecodeme is identifiable and introducing [1-7].

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INTRODUCTION OF NEW CHEMOTYPES FOR *THYMUS ERIOCALYX* (RONNIGER) JALAS IN IRAN WITH STUDY OF ESSENTIAL OIL VARIATION IN ITS POPULATION INDIVIDUALS

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Thymus eriocalyx (Ronniger) Jalas belonging to the family Lamiaceae. Among the different species this genus in the world, about 18 species represents in Iran, four of which are endemic. This species only have been reported from Iran and Iraq. To study the variation of essential oils of population individuals of this species in Iran was used method of DSS (Determination of special station). In this study, the aerial parts of 5 individual *Thymus eriocalyx* were collected from 10 localities, at full flowering stage for investigation of chemical weapons. Then air dried flowering stems of the plant were submitted to hydrodistillation using a Clevenger-type apparatus according to the method recommended in British pharmacopoeia. The essential oils were analyzed by combination of GC-FID and GC-MS. The highest total yields of oils based on dry weight belonging to the first individual of the population of 2 (4/09%) and the lowest it belongs to the second individual of the population of 10 (0/21%). Thirty one compounds were identified in the essential oil of *T. eriocalyx*. The considerable point in this research, which was done for the first time in the world, is that with compare individuals inside one population, we notice that one population individuals among themselves show variability chemical compounds. Among the existing chemical compounds in essential oils of 50 individual case study, the major components that showed among themselves widely variety were found to be as follows :*p*-Cymene (0.1-20.1%), 1,8-Cineole (0.4-29.4%), γ -Terpinene (0.07-8.7%), Linalool (0.1-82.3%), Camphor (0.2-15%), Borneol (1.6-22.7%), Geraniol (0.06-74.6%), Thymol (0.02-57.7%), Geranyl acetate (0.1-49.6%), Caryophyllene oxide (0.2-9.1%), limonene (0.2-24%) and α -Terpineol (0.1-36.2%). The results of chemical data analyzing with use from MVSP Software by UPGMA and PCO method lead to introducing 8 chemotypes for this species in the following that its 6 chemotypes are new: 1- 'Geranyl acetate' chemotype 2- 'geraniol' chemotype 3- ' α -terpineol' chemotype 4- 'linalool' chemotype 5- 'Thymol / limonene' chemotype 6- 'Geraniol / Thymol' chemotype 7- 'thymol' chemotype 8- 'linalool / α -terpineol / 1,8-cineole' chemotype [1-4].

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IDENTIFY THE SIX MOST COMMON SPECIES OF MEDICINAL PLANTS IN SOUTH KHORASAN PROVINCE

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South Khorasan with an area of approximately 9.5 million hectares is 8th vast province of Iran. The province has 228 different plant types which contain medicinal plants including 125 species in 75 genera. Each of these types covered an area of 59 hectares to 680,000 hectares of medicinal plants. This study introduces the six most common species of medicinal plants in South Khorasan province. The introduction of ecological characteristics of plants for each of them separately as well as distribution maps are provided.

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16, 17 May 2012
Kish Island



COMBINED EFFECTS OF PHYSICAL EXERCISE AND DIETING GREEN TEA ON DIETING

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Obesity is a chronic disease which is described as abnormal body weight and has major disastrous effects on people. An obese person is the one whose BMI (Body Mass Index) is higher than 30 and a person with overweight has the BMI between 25 and 30.

Although obesity is not a fatal disease, it has a close relationship with many diseases like hypertension, atherosclerosis (thickening of vessels' walls), liver and xanthic illnesses, most of the gall-bladder stones, breathing problems, osteoarthritis, varicose, infertility, pregnancy poisoning, extra hair growing in women, high blood fat and more important than others is the feeling of social deprivation and scorn.

This research was done on 60 overweight or obese people (BMI \geq 25) that were recruited from an unselected population of the people who were willing to lose weight in Iran Physiotherapy Clinic, Shiraz, Iran. Anthropometric data including measuring weight (With the sensitivity of 100 grams), height, and waist size (with the sensitivity of 1 millimeter) before eating breakfast with the least coverage and without shoes by the help of Bourer Digital Scale and meter according to standard instructions by the Physiotherapist before and after the intervention was gathered. Waist measuring was done from the region between ribs and hip bone. Body Mass Index (BMI) was calculated for all the people with the formula of weight (kilogram) divided to squared height (meter). These persons were randomly divided to two groups; with green tea drink and placebo.

All the people at the first group (30 persons) were wanted to drink green tea. Each one would drink 4 glasses of green tea before breakfast, lunch, supper and dinner, daily for a period of 2 weeks. The diet for all 60 persons in this study was supervised attentively in order to consume fat, carbohydrate, sugar, minerals, fruit, vegetable and generally speaking, all nutritional substances under the thoroughly control. All these ones (60 persons) had a 2-hour- scheduled mixed program of physiotherapy a sport for 5 days a week in these 2 weeks as it is described below.

**SEM STUDIES OF LEAF SURFACE STRUCTURE ALTERATIONS DUE TO LEAD TOXICITY IN
HYPERICUM PERFORATUM L.**

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Pb is the most common heavy metal contaminant in the environment. The present study was undertaken to determine the effects of Pb on leaf surface structure changes in *Hypericum perforatum* L. Mature plants treated with contaminated soil in 7 treatments (75, 150, 300, 600, 800, 1000, 1500 mg/kg Pb in soil) and 3 treatments by foliar spray (0.724, 1.44, 2.9 mM Pb) with 3 repeat in per treatment for 14 days. The analysis of scanning electron micrographs of the leaf surface of *H. perforatum* grown on polluted soil showed an increase in the size of guard cells, decrease in size of stomata aperture and closure of stomata in 600 and 1500 mg/kg Pb in soil, and alteration in structure and deposition of epicuticular waxes. Similar results also observed in foliar spray of Pb, but stoma was not completely closed and size of guard cells decreased.

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16, 17 May 2012
Kish Island



MODELING THE EFFECTS OF LIGHT AND GA TREATMENTS ON SEED GERMINATION OF
PAPAVER BRACTEATUM L.

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Papaver Bracteatum L. is a perennial poppy species that contains high pharmaceutical alkaloid thebaine. The species is native to Iran and the Caucasian regions and considered as a potential new crop in many countries for the production of thebaine but was found to be difficult to establish in the field. Despite being native to Iran, there is limited information on seed dormancy and germination of this species across Iran. Seeds from 9 populations of *Papaver Bracteatum* in different regions of Iran were collected. Seeds from one collection site were given gibberellic acid (GA) treatments (0, 250, 500, 750, and 1000 mgL⁻¹) under two light regimes (16/8 h light /dark, 24h dark) and were germinated at constant temperature of 17 °C in a Germination incubator. A logistic regression model was fitted to evaluate the effect of the above-mentioned treatments on the maximum cumulative germination percentage, rate of increase and germination lag times. Overall, Dark environment resulted in higher germination percentage across all GA concentrations. For seeds treated with no GA, germination percentage was higher than those treated with GA and as GA concentration increased germination percentage decreased. GA treatments did not affect any other aspect of germination curve. Comparing populations, seeds of populations collected from the north of Iran had significantly higher germination percentage compared to those from the northwest and west.

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TOXIC EFFECT OF A SELECTION OF MEDICINAL PLANT PRODUCTS AGAINST THE
PARASITIC BEE MITE VARROA DESTRUCTOR

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Varroa destructor is a dangerous pest directly for beekeeping and indirectly for crops that require insect pollination. Acaricides appeared to be effective against Varroa mite but their application within the hives contaminates the wax and honey. The problems associated with the use of acaricides proved considerable incentive to develop new treatment strategies and screening for potential acaricides to minimize these problems. Natural products might provide effective solution to the problem of varroaosis. Experiments were performed with nine treatments and three replications in a randomized complete blocks design. In the present study, we tested medicinal plant extracts including *Achillea millefolium*, *Artemisia sieberi*, *Mentha longifolia*, *Peganum harmala*, *Satureja sahandica*, *Teucrium polium* and *Thymus kotschyanus*, and *Ferula assa-foetida* resin against varroa mite. The mortality was counted after first and second weeks of treatment and total number of dead mites was recorded. All plant extracts and resin showed strong toxicity. However, *F. assa-foetida* resin and *A. sieberi* and *T. kotschyanus* extracts were stronger plant materials in the all tested times and displayed the highest number of mortality. These results demonstrated that tested plant extracts and resin can be suitable alternatives to conventional chemical substances.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ADJUSTMENT EFFECTS OF DROUGHT STRESS ON THE HERBAL PLANTAGO (*PLANTAGO PSYLLIUM* L.) WITH SALICYLIC ACID

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Drought stress is one of the most important factors that limit crop production [1]. Exogenous application of salicylic acid (SA) has been found very effective in reducing the adverse affects of drought stress. Salicylic acid is a conservative compound of some biological stresses and it is important molecular signal for adjustment plants reaction to environmental stresses [2]. This study was conducted to examine the possible role of exogenous salicylic acid on germination and seedling stage of *Plantago* (*plantago psyllium* L.) as herbal medicinal plant under drought stress. Thus for this purpose, an experiment design in case of factorial (AB) base completely randomized design (CRD) with three replications at Seed technology laboratory in Shahed University were conducted. Combination of salicylic Acid hormone levels (0, 0.3 and 0.6 mM) and drought stress levels (0, 0.4, 0.8, 1.2 and 1.6 Mpa) on germination and seedling growth as factors were applied. The results showed that the effect of drought stress, salicylic acid and its interaction on germination and seedling growth including (germination percentage, germination rate, shoot length, root length, shoot weight, root weight and some soluble components as proline content was significant ($P < 0.01$)).

In which, with applying drought stress up to 1.6 Mpa, most parameters of germination and plant growth decreased so in drought conditions, the highest and lowest of germination percentage were obtain in control (98.22% and at 1.6, was 0.88%), respectively. Overall, results showed that the priming treatments of salicylic acid (0.3 mM) on seeds of herbal *Plantago Psyllium* can increase its tolerance to drought in germination and plant seedling stage. In other words, it seems that salicylic acid were able to enhance the tolerant ability of the *plantago* plant to drought stress.

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ANTIOXIDANT ACTIVITY AND TOTAL PHENOLICS OF STEM AND ROOT EXTRACTS OF *DESCURAINIA SOPHIA* L. (FLIXWEED) GROWING WILD IN NORTH OF IRAN

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Descurainia sophia (flixweed) is an annual species belonging to family Brassicaceae (Cruciferae). This species is only species of the genus *Descurainia* in Iran and distributes in all parts of Iran from below sea level up to 3000 m [1]. It has traditionally been used as a folk medicine in many countries and in Iran [2]. The aerial parts of *D. sophia* are also used as vegetable in north of Iran. Up to now, several phytochemical studies have identified the presence of various compounds [3-4]. There is a report on the essential oil analysis of aerial parts of *D. sofia* in the literature [5]. In previous investigation [6], we showed that the leave extracts of this plant are include high antioxidant activity. The aim of the present study was to evaluate the antioxidant properties of the stem and root extracts of this valuable plant.

Water, methanol, ethanol and acetone were used as solvent and antioxidative effects measured by using 2,2-diphenyl-1-picrylhydrazyl (DPPH), reducing power, total antioxidant activity and linoleic acid assays. In all the assays, polar solvents exhibited stronger activities than less-polar solvents. Methanol proved to be the most effective solvent for extraction of antioxidants from *D. sophia* stems and roots as it contained the high amount of phenolic compounds (5.76 ± 0.04 mg GAE/dry matter for stems and 5.33 ± 0.02 mg GAE/dry matter for roots) and also exhibited the strong antioxidant capacity in all the assays used. Although the antioxidant action of this extract was lower than that of ascorbic acid and BHT. Generally, the stem and root extracts shoewd relatively similar antioxidant activity.

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CHEMICAL COMPOSITIONS OF ESSENTIAL OIL AND FATTY ACIDS AND ANTIOXIDANT ACTIVITY OF EXTRACTS OF *FICARIA KOCHII*

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The genus *Ficaria* previously considered as a subgenus within the genus *Ranunculus*, is now a separate genus in Ranunculaceae family [1]. According to Flora Iranica there is only one species of *Ficaria* in Iran, i.e. *F. kochii* (Ledeb.) Iranshahr & Rech.f. which is mainly distributed in upper altitudes just near to snow-melted area. The global distributional area of the species is confined to Turkey, Iraq, Caucasus and Iran [2]. There is no report on the phytochemical analysis of *F. kochii* in the literature.

The present study was conducted to examine the chemical composition of essential oil and fatty acids and antioxidant activity of various extracts of *Ficaria kochii* native to Iran. GC and GC/MS analyses of the oil resulted in the identification of 61 compounds, representing 86.01% of the oil; phytol (10.49%), farnesol (7.72%), methyl linoleate (5.57%) and α -Farnesene (4.96%) were the main components.

The fatty acid composition of aerial parts of *F. kochii* were also analysed by GC/MS. The major components were palmitic acid (25.85%), linolenic acid (25.37%) and linoleic acid (17.47%). Polyunsaturated fatty acids (PUFAs) were found in higher amounts than saturated fatty acids.

The various extracts (prepared by using solvents of various polarity) of *F. kochii* aerial parts were subjected to screening for their possible antioxidant activity by using 2,2-diphenyl-1-picrylhydrazyl (DPPH), reducing power, total antioxidant activity and linoleic acid assays. Water proved to be the most efficient solvent for extraction of antioxidants as it contained the highest amount of phenolic compounds (2.78 ± 0.23 GAE/g dry matter) and also exhibited the strongest antioxidant capacity in all the assays used. The results of the present investigation demonstrate that aerial parts of *F. kochii* can be used as natural and safe nutrition in place of synthetic ones.

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EFFECT OF IRRIGATION AND NITROGEN SPRAY ON HERB YIELD AND OIL CONTENT OF *SATURJA SAHANDICA* Bormn.

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Saturja sahandica Bormn. is a medicinal plant growing wild only Iran [1]. The aerial parts of this plants used in the kitchen and its essential oil in food and medicine industrial [2, 3]. Effect of irrigation intervals (4, 8 and 12 days) and nitrogen foliar spray (0, 3 and 6 kg /ha) studied on herb yield and essential oil content of *Satureja Sahandica*. An experiment split plot randomized complete block design with three triplication in the field research was conducted 2010 in Qazvin. Herb yield of 4, 8 and 12 irrigation interval were 119, 109 and 69 g/m² respectively, that there were significant different between 4 and 8 days. Herb yield of 0, 3 and 6 kg nitrogen /ha were 79, 97 and 117 g/m² that there were significant different among treatments. Essential oil content of 4, 8 and 12 irrigation interval were 2.1%, 2.3% and 3% respectively, that there were no significant difference between 4 and 8 days but them were less than 12 days irrigation. Essential oil content of 0, 3 and 6 kg nitrogen /ha was 2.4%, 2.5% and 2.6% that there were no significant different among treatments. Generally whit using of 8 days irrigation interval and foliar sprays 6 kg nitrogen/ha the most herb yield and essential oil content was obtained.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE CONTENT OF SOME SECONDARY METABOLITES OF DIFFERENT LOCALITIES OF KERMAN PROVINCE (IRAN) REGARD TO CLIMATE FACTORS

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It is well known that the response of plants to climate depends on their life history characteristics and ecophysiology and largely differs between species. There has been little focus on investigating effects of climate conditions on medicinal plants and their secondary metabolite production [1]. Licorice (*Glycyrrhiza* species) is a very popular medicinal plant in the world [2]. *Glycyrrhiza glabra* L. (Leguminosae) is native to the Mediterranean area, central and southern Russia, the Anatolian peninsula, and Iran [2]. In this investigation, the content of some biochemical compounds important in pharmacy, food industry and economics were compared in *G. glabra* root gathering of seven localities of Kerman province. The highest content of glycyrrhizin and flavonoids were found in Andohjerd. Shahrabak showed the highest content of total phenolic compounds while the lowest was found in Andohjerd. Tannins and sugar content were highest in roots gathered from Baft and Zangiyabad, respectively. The results showed a correlation between tannins and glycyrrhizin content and latitude of locality. Total phenolic contents had correlation with longitude. Anthocyanin in the roots was correlated with soil pH and EC while, sugar content showed correlation only with soil pH. Based on the results, it seems that the pattern of secondary metabolites production differs based on climatic conditions.

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DETERMINATION OF APPLICATION TIME OF DIFFERENT PRIMING ON MEDICINAL PLANT, BLACK CUMIN (*NIGELLA SATIVA*) GERMINATION UNDER DROUGHT STRESS

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Priming is one way of increasing the seed germination and growth characteristics. In view of the fact that priming has the important function to improve the seeds to high water absorption for germination under drought stress, In order to determination of application time of different priming on black cumin (*Nigella sativa*) seed germination under drought stress (PEG concentration -3 bar) an experiment carried out in a completely randomized design with three replications. Applied priming levels included hydro priming with distilled water and salicylic acid (0.2 and 0.5%) and two levels of potassium nitrate (1% and 3%) and a control without prime, in four times (2, 6, 12 and 24 hours). Interaction of Types and times of priming had significant effect on germination traits. Results showed that priming increased seed germination percentage, rate and index and increased root and shoot length. So that 12 hours application of potassium nitrate 1% and 3%, salicylic acid 0.2% and distilled water and 6 hours application of salicylic acid 0.5%, shown maximum germination percentage, rate and index and root and shoot length. Application of salicylic acid 0.2% for 12 hours, among the other types of priming shown maximum germination percentage (92.0), rate (8.7) and germination index (5.6) [1-3].

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OPIOID DEPENDENCE AND TREATMENT OF WITHDRAWAL IN IRANIAN TRADITIONAL MEDICINE AND CONVENTIONAL MEDICINE

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Narcotic addiction is a physical and psychological dependence with some social and economical subsequences. Because of physical dependence, one of the important results of addiction is withdrawal. Withdrawal produces nausea and diarrhea, coughing, lacrimation, mydriasis, rhinorrhea, diaphoresis, muscle twitching, piloerection, fever, tachypnea, hypertension, diffuse body pain, insomnia, and yawning. Relief of these exceedingly unpleasant symptoms by narcotic administration leads to more frequent narcotic use. Pharmacologic treatments of withdrawal often center on relief of symptoms of diarrhea with loperamide, of "sniffles" with decongestants, and pain with NSAIDs. Comfort can be enhanced with administration of the alpha 2-adrenergic agonist clonidine to decrease sympathetic nervous system over activity. One main treatment strategy of narcotic addiction is management with Methadone maintenance. Methadone -a long-acting opioid- is optimally effective in blocking heroin-induced euphoria, decreasing craving, and maintaining abstinence from illegal opioids. Due to psychological dependence, abstinence has high percentage of failure [1].

Using narcotics -particularly opium- has a long history and medicinal use and also abuse of opium are well described in textbooks of Iranian Traditional Medicine (ITM). "*Resala Afyoonia*" (a treatise about opium) of Imad al-Din Mahmoud Shirazi is an obvious example pointing out the special attention of ITM to this issue [2]. In this treatise, nature, properties, and adulterants of opium along with medical advantages and disadvantages of using it are discussed. Some protocols for opium abstinence are also mentioned. Opium abstinence is also noted in some other ITM books [3].

Sudden opium abstinence has many harmful effects on human body according to ITM point of view. The treatment should be gradual through 3 steps: 1- gradual increase in dose interval 2- decrease in dose of opium 3- replace some non- narcotic substances instead of opium. These substances include analgesic, brain and heart tonics, and mood elevators (*mofarrah*) [2, 3].

According to our research, traditional abstinence method has fewer side effects and more benefits than conventional methods. More investigations are recommended to clarify advantages and disadvantages of ITM methods.

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ASSESSMENT OF ANTIFUNGAL EFFECT OF ESSENTIAL OIL OF *BUNIUM PERSICUM* ON *CANDIDA ALBICANS* IN-VITRO

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Bunium persicum with common name of Black cumin is gramine plant from Umbelliferae family that is growing in warm and dry regions of Iran. *Candida albicans* is a kind of yeast that known as normal flora of gastrointestinal tract (GIT), respiratory and genitourinary (GU) mucosa and skin. The aim of this study is assessment of antifungal effect of essential oil of *Bunium persicum* on *Candida albicans* in-vitro.

In this laboratory study 28 plates receptacle of *Candida albicans* that had been passaged on Sabouraud dextrose Agar medium, 7 of them as control (without essential oil of *Bunium persicum*) and 21 as case consist of 1mg/ml, 2mg/ml and 3mg/ml (each of them 7 plates) has been assessed. All plates that was in 37 c incubator for 72 hours (h) has been colony counting each 24h by crossbar paper and Heerbrugg WILD stereoscope. Finally all results statistically have been analyzed by SPSS, Exact Fisher test and descriptive statistics.

After first 24h *Candida albicans* yeasts has been cultured in all control plates but in none of the case groups no growth has been seen ($p < 0.001$). In second 24h all control and 1mg/ml of case groups had positive pick up but no culture observed in 2mg/ml and 3mg/ml ($p < 0.001$). Finally after 72h although positive culture was seen in control, 1mg/ml and 2mg/ml, any culture has not been observed in 3mg/ml ($p < 0.001$).

Results demonstrated all 3 concentrations could delay culture of *Candida albicans* and induce stay effect on that. Time of staying culture of fungi was depended on essential concentration in medium.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



MEDICINAL PLANTS WITH MOST TRADITIONAL USAGE IN EAST- MAZANDARAN REGION

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Usage of different medicinal plants is one of the most important knowledge in medicine and another science for more researching in all over the world. So investigation in traditional medicine in different region is useful for various science and next surveys. In this study we chose East-Mazandaran in North of Iran with mountainous and arduous heights region. We asked some question about medicinal plants from native people especially eldest women and men and some usage of them in the area then we found 14 species belonged to 11 families with the most traditional usage in this region. Another way we found that native people use some of the medicinal plants in different manners for various illnesses. Our purpose is to introduce this medicinal plants and their different usage in this area.

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CHANGES IN THE AMOUNT OF ESSENTIAL OIL EUCALYPTUS SPECIES GROWN IN QOM AND ITS RELATION TO MORPHOLOGICAL CHARACTERISTICS OF LEAVES

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Genus (*Eucalyptus sp*), from the Myrtaceae, and industrial use, food, medicine, pharmaceuticals, cosmetics and health. Native of Australia and other areas of the continent are taken. The tree species has been entered to Iran over hundred years [1]. As respects environmental and genetic factors that lead to Incidence of different morphological traits are, the type and amount of secondary metabolites affect [2]. Therefore in this study eucalyptus essential oil yield of different species with different morphological characteristics were studied. The species *E. grandis*, *E. camandulensis*, *E. microtheca*, *E. rubida* were collected from the research station engineer BADIIE Qom, at the end of June. The morphological comparisons, samples of leaves dried in the shade and at room temperature for two weeks, and after that they were milled. Then distillation with water was performed for hundred minutes. Analysis of data and graphs was calculated and plotted with software Minitab16. Data analysis showed that the essential oil of the species studied significant at 1%. Leaf number and leaf length in *E. grandis*, leaf length and leaf width in *E. camandulensis*, leaf number and leaf length in *E. microtheca*, leaf area and leaf width in *E. rubida*, had been the greatest impact on essential oil respectively. The climate is the important environmental factors affecting in secondary metabolites. Full sun and favorable conditions of temperature with fluctuating around 30°C in Qom, are gathered to make condition for essential oil accumulation in plants, especially on tree types.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF DIFFERENT LEVELS OF NITROGEN, PHOSPHORUS, POTASSIUM, MICRONUTRIENT AND ORGANIC FERTILIZERS ON QUANTITY AND FLOWER YIELD ESSENTIAL OIL OF *ROSA DAMASCENE* IN IRAN

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In this project the effect of chemical fertilizers, organic manure and their combination on the quality of essential oils of Damask Rosa in Karaj Alborz research station was investigated. In this experiment nitrogen, phosphorus and potash and a combination of trace elements as fertilizer and cow manure was used. Chemical fertilizers and livestock were used in 20 independent treatments with three replicates in a complete block randomized statistical design.

Amount of essential oil at different treatments was measured in 3 years. The results of analysis of variance and mean performance showed that the difference between treatments was significant in level of 1%. Treatment No. 17 with 80 kg nitrogen, 80 kg phosphorus, 40 kg potassium and 30 tons of manure per hectare had the highest amount of essential oil. The average amount of essential oil in three consecutive years in treatment No. 17 with 0.35 percent is the highest and in control with 0.24 percent is the lowest value. Average oil yield in the three years is highest in treatment No. 3, which consisted of 40Kg/ha N, 40Kg/ha P and 40Kg/ha K, (1395.58 g/ha) and minimum in treatment No. 13, which consisted only 40 tons of manure, (685.93 g/ha) and after that control have the minimum oil yield (810.53 g/ha) in these three years.

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EFFECTS OF DIFFERENT FERTILIZERS (MACRO AND MICRO ELEMENTS) ON FLOWER YIELD, QUANTITY AND QUALITY OF ESSENTIAL OIL AND OTHER BYPRODUCTS OF *ROSA DAMASCENA* IN IRAN

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In this project the effect of chemical fertilizers, organic manure and their combination on the quality of essential oils of Damask Rosa in Karaj Alborz research station was investigated. In this experiment nitrogen, phosphorus and potash and a combination of trace elements as fertilizer and cow manure was used. Chemical fertilizers and livestock were used in 20 independent treatments with three replicates in a complete block randomized statistical design.

The Composition of essential oil in the first year of flowering shows that Linalool, Geraniol and Citronellol has increased 88, 39 and 36 percent respectively in treatment No. 3 which received 40 kg of nitrogen, 40 kg phosphorus and 40 kg potassium per hectare, compared with the control. In the second year flowering, the amount of Geraniol in treatment No. 3 has increased by 45 percent and that of hexadecanol and heptadecane decreased 45 percent and 30 percent compared with the control. The amount of Citronellol, Linalool, Nonadecane, Henicosane and Eicosane did not differ with the control. Citronellol's rate had the greatest value in treatment that received 40 kg nitrogen, 40 kg phosphorus and 40 kg potassium and 15 ton manure per hectare. Geraniol's value has been the highest in the treatment 3 and Linalool in treatment 6 with 120 kg /ha, 120 kg /ha and 80 kg /ha Nitrogen, phosphorus and potash.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF DROUGHT STRESS AND BIO-FERTILIZER ON FLOWER YIELD, PHOTOSYNTHESIS PIGMENTS CONTENT AND PROLINE OF MARIGOLD MEDICINAL PLANT (*CALENDULA OFFICINALIS* L.)

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Biofertilizers are an alternative to mineral fertilizers for increasing soil productivity and plant growth in drought stress. To determine the effects of drought and nitrogen bio-fertilizer on flower quantitative yield, photosynthesis pigments, and proline content of Calendula (*Calendula officinalis* L.) an experiment was carry out in South region, north of Tehran. This study has been conducted split plot based on randomized complete block design with three replications in 2010-2011. The factors treated at fourth leaflet stages and were including: D₁ (Control or applying 0.5 atm as field capacity (FC)), D₂ (applying potential of 3.5 atm), D₃ (applying potential of 6.5 atm), and D₄ (applying potential of 10 atm), and nitrogen levels N₁ (Control or no applying nitrogen fertilizer), N₂ (2 L/ha nitrogen as nitrogen) and N₃ (2 L/ha bio-fertilizer as nitrogen in case of seeding). The traits of plant height, flower yield, the flower harvests of dry weight, photosynthesis pigments content and proline content. The results showed that drought stress, nitrogen fertilizer and its interaction had significant effect on plant height, flower yield, the flower harvests of dry weight, photosynthesis pigments content and proline content ($\alpha=5\%$) In which the most flower yield (574.46 kg.ha⁻¹) were achieved under soil medium stress (0.5 atm). Also, maximum of plant height (25.22 cm) and photosynthesis pigments contents (17.59) were obtained on soil medium stress and proline content in optimum irrigation (0.5 atm) 47 % were lower than hard relatively stress. Application of the drought and bio-fertilizer increased qualitative and quantitative yield of Calendula. Also, the application of Bio nitrogen can be in order to reduction in application of nitrogen fertilizer in agro-ecosystem. Overall results showed that environmental factors as drought stress caused changing in medicinal growth plants and its quality and quantity of ingredients' effects.

EFFECT OF DIFFERENT MEDIA AND SALINITY LEVELS ON GROWTH PARAMETERS OF ROSEMARY (*ROSMARINUS OFFICINALIS* L.)

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Nowadays, saline stress is one of the major factors limiting agricultural production. According to the recent estimate, 20 percent of world's areas are faced with the problem of salinity. Increasing of saline lands and the shortage of agricultural lands, identification and improvement of salt tolerant plants particularly medical and ornamental is important. Purpose of this trial is investigation of different growth media and salinity effect on growth of rosemary (*Rosmarinus officinalis* L.). This pot experiment carried out as a factorial experiment with randomized complete block and three replications. Four levels of saline water included: tap water (a₁), saline water containing NaCl 100 Mm (a₂), saline water with 150 Mm NaCl (a₃) and Caspian Sea water (a₄). Applied different media were loam soil (b₁ or control), "control medium and Azolla compost" (1:1) (b₂), "peanut cocoon and control medium" (1:1) (b₃) and the fourth media "40% Azolla compost, loam soil 30% and rice husk 30% (b₄). Salinity treatment was applied for three weeks and some growth parameters were measured. The results showed that the interaction of salinity and media influenced significantly ($p<0.05$) plant height, number of lateral branches, root dry weight and root length but the factors interaction did not have significant effect on number of leaves and root fresh weight.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



COMPARISON OF ANTIBACTERIAL EFFECTS OF *BUNIUM PERSICUM*, *THYMUS DAENENSIS* AND *THYMUS* SPP. (ELAM ECOTYPE) ESSENTIAL OILS AGAINST FOUR ENTEROHEMORRHAGIC *ESCHERICHIA COLI* STRAINS

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The essential oils of *Bunium persicum*, *Thymus daenensis* and *Thymus* spp. (Elam ecotype) contain variety of components with different therapeutical effects. The purpose of this study was to provide the examination of antibacterial effects of essential oils of *Bunium persicum*, *Thymus daenensis* and *Thymus* spp. (Elam ecotype) against of 4 enterohemorrhagic *Escherichia coli* strains (*O157*, *O111*, *O26* and *O2*) by micro broth dilution assay.

The plants purchased from a local grocery store at Shahrekord and were identified by the Researches Centre of Medicinal and Aromatic Plants, Islamic Azad University, Shahrekord Branch, Iran. The air-dried aerial parts were subjected to hydrodistillation using a Clevenger apparatus to obtain essential oil. Antibacterial activity (on basis of Minimum Inhibitory Concentration (MIC)) of the plants was studied by micro broth dilution assay.

Bunium persicum, *Thymus daenensis* and *Thymus* spp. (Elam ecotype) essential oils exhibited complete inhibition against *O157* at 450, 50 and 200 ppm, against *O111* at 400, 40 and 150 ppm, against *O26* at 400, 200 and 250 ppm and against *O2* at 700, 45 and 175 ppm, respectively, by micro broth dilution assay. In conclusion, the results presented here show that *Thymus daenensis* essential oil is more effective against *Escherichia coli O157*, *O111*, *O26* and *O2*.

COMPARATIVE ANTIBACTERIAL EFFECTS OF *THYMUS DAENENSIS* AND *THYMUS* SPP. (ELAM ECOTYPE) ESSENTIAL OILS AGAINST EIGHT FOODBORNE PATHOGENS

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Essential oil of *Thymus daenensis* and *Thymus* spp. (Elam ecotype) contains variety of components with different therapeutical effects. The purpose of this study was to provide the examination of antibacterial effects of essential oil of *Thymus daenensis* and *Thymus* spp. (Elam ecotype) against eight foodborne pathogens (*Pseudomonas aeruginosa*, *Clostridium botulinum*, *Bacillus cereus*, *Staphylococcus aureus*, *Salmonella typhimurium*, *Yersinia enterocolitica*, *Listeria monocytogenes* and *Listeria ivanovii*) by micro broth dilution assay.

The plants purchased from a local grocery store at Shahrekord and were identified by the Researches Centre of Medicinal and Aromatic Plants, Islamic Azad University, Shahrekord Branch, Iran. The air-dried aerial parts were subjected to hydrodistillation using a Clevenger apparatus to obtain essential oil. Antibacterial activity (on basis of Minimum Inhibitory Concentration (MIC)) of the plants was studied by micro broth dilution assay.

Thymus daenensis and *Thymus* spp. (Elam ecotype) essential oil exhibited complete inhibition against *Pseudomonas aeruginosa* at 200 and 100 ppm, *Clostridium botulinum* at 200 and 100 ppm, *Bacillus cereus* at 150 and 100 ppm, *Staphylococcus aureus* at 125 and 75 ppm, *Salmonella typhimurium* at 150 and 100 ppm, *Yersinia enterocolitica* at 125 and 100 ppm, *Listeria monocytogenes* at, 200 and 150 and against *Listeria ivanovii* at 175 and 150 ppm, respectively, by micro broth dilution assay. In conclusion, the results presented here show that *Thymus* spp. (Elam ecotype) essential oil is more effective than *Thymus daenensis* against the foodborne pathogens.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



COMPARISON OF ANTIBACTERIAL ACTIVITIES OF ESSENTIAL OILS FROM *THYMUS DAENENSIS* AND *THYMUS* SPP. (ELAM ECOTYPE) AGAINST TWO FISH PATHOGENS, *STREPTOCOCCUS INIAE* AND *LACTOCOCCUS GARVIEAE*

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Clinical and macroscopic findings (anorexia, lethargy, loss of orientation and exophthalmia) indicate that *Streptococcus iniae* and *Lactococcus garvieae* infections of trout share some common features. Meningitis and panophthalmitis are the main lesions among *S. iniae* infected trout, whereas *L. garvieae* infection results in a hyperacute systemic disease. The essential oil of *Thymus daenensis* and *Thymus* spp. (Elam ecotype) contains variety of components with different therapeutical effects. The purpose of this study was to provide the examination of antibacterial effects of essential oil of *Thymus daenensis* and *Thymus* spp. (Elam ecotype) against *S. iniae* and *L. garvieae*.

The plants purchased from a local grocery store at Shahrekord and were identified by the Researches Centre of Medicinal and Aromatic Plants, Islamic Azad University, Shahrekord Branch, Iran. The air-dried aerial parts were subjected to hydrodistillation using a Clevenger apparatus to obtain essential oil. Antibacterial activity (on basis of Minimum Inhibitory Concentration (MIC)) of the plants was studied by micro broth dilution assay.

Thymus daenensis and *Thymus* spp. (Elam ecotype) essential oil exhibited complete inhibition against *Streptococcus iniae* at 175 and 100 and against *Lactococcus garvieae* at 200, and 100 ppm, respectively, by micro broth dilution assay. In conclusion, the results presented here show that *Thymus* spp. (Elam ecotype) essential oil is more effective than *Thymus daenensis* against *S. iniae* and *L. garvieae*.

COMPARISON OF ANTIOXIDANT PROPERTIES AND PHYTOCHEMICAL COMPOUNDS FROM *GANODERMA APPLANATUM*

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Ganoderma species are one of the most widely researched fungi because of their reported potent bioactive properties [1]. They belong to the kingdom of fungi, the division of Basidiomycota, the order of Polyporales, the family of Ganodermataceae [2].

Antioxidant properties of methanolic extract of *Ganoderma applanatum* were examined. Various experimental models DPPH radical scavenging activity and iron (III) reducing capacity were used for characterization of antioxidant activity. Antioxidant activities were dependent of the concentration. DPPH radical scavenging activity was the highest at the concentration of 1000 $\mu\text{g mL}^{-1}$ (90.61%) and was the lowest at the concentration of 12.5 $\mu\text{g mL}^{-1}$ (2.36%). Reducing power capacity was the highest at the concentration of 1000 $\mu\text{g mL}^{-1}$ (0.774) and was the lowest at the concentration of 12.5 $\mu\text{g mL}^{-1}$ (0.163). The total phenol content of methanolic extract was 11.94 ± 1.52 and total flavonoid content of methanolic extract was 7.35 ± 2.66 .

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF SEED BIOPRIMING WITH PLANT GROWTH PROMOTING RHIZOBACTERIA (PGPR) ON GERMINATION COMPONENTS AND SEEDLING GROWTH OF *SILYBUM MARIANUM* CULTIVARS

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In order to investigate the effects of seed biopriming with plant growth promoting rhizobacteria (PGPR) on germination components and seedling growth of *Silybum marianum* cultivars, a factorial experiment based on randomized complete block design with three replications was conducted at the seed technology laboratory of Islamic Azad University, Ardabili Branch in 2010. Factors were: *Silybum marianum* cultivars in three levels (Majar, Babak, CN-SEED) and seed biopriming with plant growth promoting rhizobacteria in four levels (no priming, seed biopriming with *Azetobacter chroococcum* strain 5, *Azospirillum lipoferum* strain OF, *Pesedomunad* strain 186). The results showed that seed priming with PGPR had considerable effect on growth seedling, uniformity of germination, radicle and plumule dry weight, germination percentage. Cultivars had different response to germination indices and seed biopriming with plant growth promoting rhizobacteria. Seed biopriming with PGPR increased germination indices. Germination indices in CN-SEED cultivar were better than others. Seed biopriming with *Azetobacter chroococcum* strain 5 increased proportion of radicle to plumule, longer radicle and plumule compared with priming with *Azospirillum lipoferum* strain OF, *Pesedomunad* strain 186 and no priming. Thus, in order to increasing of germination indices and seedling growth, it can be suggested that seeds priming of CN-SEED cultivar was applied with *Azetobacter chroococcum* strain 5.

THE TOTAL SUGAR CONTENT AND PHYTOCHEMICAL COMPOUNDS IN DIFFERENT SOLVENTS IN DIFFERENT PARTS OF *GANODERMA LUCIDUM*

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Ganoderma lucidum is one of medicinal fungi because of benefit effects. This fungus has stem and fruiting body. In this study *Ganoderma lucidum* collected from Shast kola forest of Gorgan. To study, stem and fruiting body separated. The parts extracted by different solvents including methanol (70%), ethanol (70%) and water.

Different concentrations of gallic acid make as standard. The total phenol was higher in respectively fruiting body+stem> stem>fruiting body in all solvents. Different concentration of kuersetin make as standard. The total flavonoid was higher in respectively fruiting body+stem> stem>fruiting body in all solvents. Comparative of phenolic compounds shown that in methanolic extract the total flavonoid was the highest in all parts. In ethanolic extract the total flavonoid was highest in fruiting body+stem and stem but in ethanolic extract of fruiting body the total phenol was the highest. In water extract, the total phenol was highest in all parts.

To assay total sugar content in different parts of *Ganoderma lucidum* make different concentrations of glucose monohydrate as standard. The total sugar content was higher in the following order fruiting body+stem> stem>fruiting body.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF SILVER NANOPARTICLES (SNP) AND ESSENTIAL OILS TO EXTEND VASE-LIFE OF LILLIUM 'ROBINA' CUT FLOWERES

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In 2011, an experiment in order to assess the effect of Essential oils and Silver NanoParticles (SNP) to extend vase-life of Lillium 'Robina' cut floweres was used. An experiment was arranged as a factorial experiment, based on completely random design blocks with three replications. (factor a: various concentrations of *Satureja hortensis* L. essential oil treatment used were 50-75-100 mgL⁻¹. various concentrations of Silver NanoParticle treatment used were 5-10-20 mgL⁻¹ and their inter action effects),(factor b: various concentrations of *Thymus daenensis* essential oil treatment used were 50-75-100 mgL⁻¹. various concentrations of Silver NanoParticle treatment used were 5 -10 -20 mgL⁻¹ and their interaction effects),(Control treatment: Distilled water).The identification of the compounds and amounts which comprise essential oils was done using the gas chromatograph device which was connected to the device (GC/MS). In this study some characters was to evaluated such as ; Fresh weight, water absorbtion, chlorophyll a & b, Cartenoid contents, quality and Vase life of lilium flowers.The results obtained show that using (50-75 mgL⁻¹) concentration of *Thymus daenensis* and *Satureja hortensis* essential oils had highest efficiency on Fresh weight and water absorbtion. But, the highest efficiency was observed in using interaction effects between *Thymus daenensis* and Silver NanoParticles, *Satureja hortensis* and Silver NanoParticles. Based on our results, SNP (10mgL⁻¹) plus *Thymus daenensis* (50mgL⁻¹) plus Sucrose(4%) had highest Cartenoid contents. Vase-life was improved from 8 days to 12.94 days after keeping flowers in solutions containing 10mgL⁻¹ SNP plus 100 mgL⁻¹ *Thymus daenensis* plus Sucrose (4%) to the preservative solution. Also, treatment of 20 mgL⁻¹ SNP plus 100 mgL⁻¹ *Satureja hortensis* plus Sucrose (4%) extend vase-life of lilium flower from 8 days to 13 days. In conculusion, using various concentrations of essential oils and SNPs in preservative solutions showed promising prospects for the cut flowers vase-life.

EFFECT OF PHOSPHORUS BIOFERTILIZERS ON THE YIELD AND YIELD COMPONENTS OF DWARF BLACK CUMIN (*NIGELLA SATIVA* L.)

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Application of biofertilizers especially mycorrhiza is one of the most important methods for plant nutrition in ecological agriculture. In order to evaluate the effects of biofertilizers on growth characteristics and yield of black cumin (*Nigella sativa* L.) (dwarf variety), a field experiment was carried out based on randomized complete block design with four replications at the Agricultural Field of Shirvan College, Iran 2010-2011 growing season. Treatments included: mycorrhiza, phosphate solubilizing bacteria (PSB) and control. The results showed that the effect of phosphorus biofertilizers was significant (p<0.01) on black cumin growth characteristics, yield and yield components. Inoculation with mycorrhiza and PSB enhanced plant height 61 and 25% and decreased percentage of hollow capsules 78 and 61% compared with control, respectively. The highest biological yield seed observed in mycorrhiza (5.03 and 1.27 kg.m⁻², respectively) and the lowest was for control (2.25 and 0.71 kg.m⁻², respectively). This study showed that application of suitable biofertilizers could increase yield and yield components of black cumin.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



PREVENTION OF LIPID OXIDATION IN COOKED SAUSAGE BY *MENTHA PIPERITA*
ESSENTIAL OIL AS A NATURAL ANTIOXIDANT

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The aim of this work was to evaluate the effect of nitrite partial replacement with *Mentha piperita* essential oil (MPEO) on oxidative properties of cooked sausage. Nitrite content (120 ppm) was reduced and replaced with 20, 40 and 60 ppm of MPEO. The effect of MPEO on product rancidity was assessed by peroxide and TBARS values in sausage samples. Also, the effect of this replacement on the product color stability was evaluated by determination of L*, a* and b* values, Hue angle, and $\Delta E_{(2-30)}$. Antimicrobial properties of the essential oil were evaluated by MICs and MBCs determination against *Escherichia coli* and *Clostridium perfringens* by micro dilution method. Results indicated that peroxide and TBARS values of sample with 20 ppm of MPEO were significantly lower than samples with 40 and 60 ppm of MPEO and control, at the end of storage period. With respect to color parameters, hue angle of the sample with 60 ppm of MPEO was significantly higher than samples with lower essential oil levels and control after 30 days of storage. Moreover, total color difference of sample with 60 ppm of MPEO was lower than other samples and control ($P<0.05$). Antimicrobial activity of MPEO against *Escherichia coli* determined as MICs and MBCs were 0.226 and 0.453 mg/ml, respectively. These values turned out as 0.453 and 0.906 mg/ml against *Clostridium perfringens*. Sensory analysis of samples showed no significant difference between essential oil containing samples and control.

THE EFFECT OF DIFFERENT DENSITIES OF ETHANOL & METHANOL ON GERMINATION OF
SEED (*PLANTAGO PSYLLIUM*)

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A full study has been carried out on germination and *P. psyllium* seed growth in a lab study in April 2011, in institute of medical plants in order to evaluate the influence of different densities of methanol and ethanol in a full random plan by 3 repetitions. Regarding this, levels of (0/4, 0/8, 1/2, 1/6, 2, 3) for methanol and ethanol have been taken into study. The study result showed that the variation of density had significant effects on the percentage of germination, length of hypocotil and radicle, the ratio of hypocotil length to radicle length, fresh weight of hypocotyl, dry weight of radicle, total fresh weight, dry weight of hypocotyl and total dry weight ($p<0.01$) and fresh weight of radicle ($p<0.05$). In this research the most percentage of germination is achieved by using methanol 1/2, 1/6. Also the most hypocotil and radicle length has been obtained by using methanol 0/4. In addition, the maximum ratio of hypocotil length to radicle length using ethanol 0.8, the most fresh weight of hypocotil using methanol 1/2, the most dry weight of hypocotil in methanol 2, the most dry weight of radicle using methanol 1/6, and the most total dry weight using methanol 1/6, have been gained.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



AN INVESTIGATION AND COMPARISON OF THE EFFECTS OF NATURAL COMPOSITION *STAPHYLOCOCCUS AUREUS*, *GEOTRICHUM CANDIDIUM* IN INDUSTRIAL DOOGH SAMPLES WITH RESPONSE SURFACE METHOD

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Nowadays use of natural antimicrobial compounds, including powders as preservative compound of the food in be increased. In this study the antimicrobial effect of powders of, Lamiaceae plants (*Thymus vulgaris* L., *Mentha* spp. and *Ziziphora tenuir* L.) to prevent growth of pathogenic bacteria (*Staphylococcus aureus*, *Geotrichum candidium*) were studied industrial doogh samples. For this purpose, three levels of concentration of powder (0, 0.075, 0.15 v/v) was chosen. Survival or reduce the bacterial population in 20 treatments (3 repeated) for samples sterilized doogh during 7 days by measuring the kinetics of bacterial pathogens was investigated using response surface design. Results of antimicrobial compounds in samples of natural inhibitory industrial doogh powder plant on *Staphylococcus aureus* revealed that lamiaceae plants powder to a greater degree of impact on reducing populations of *Geotrichum candidium*. Formulated powders to reduce or optimize the kinetics of bacterial pathogens *Staphylococcus aureus* at concentrations of *Thymus* % 0.04 (v/v), and *Mentha* powders % 0.05 and powders *Ziziphora* % 0.14(v/v) is the inoculation rate, which in most circumstances Reduction of *Staphylococcus aureus* in 7 days 1.07 Log/cfu.

EFFECTS OF CATTLE MANURE AND BIOFERTILIZER APPLICATION ON QUANTITY AND QUALITY OF ESSENTIAL OIL IN CORIANDER (*CORIANDRUM SATIVUM*)

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In order to reach to quality increasing, environment conservation and society health, organic manures and biofertilizers application in medicinal plants production in sustainable agriculture is very important. The aim of this study was to determine the Effects of Cattle Manure and Biofertilizer Application on essential oil content and linalool content, alpha-Pinene content and gamma-Terpinene content in essential oil in Coriander (*Coriandrum sativum* L.). Research was carried out as factorial experiment by using two factors of cattle manure (5, 10, 15 and 20 ton/ha) and nitrogenic biofertilizer (inoculation with azotobacter, inoculation with azospirillum and inoculation together) in the base of randomized complete blocks design with twelve treatments and three replications at homand research station in Damavand of Iran in 2010. These treatments with a control treatment (without fertilizer) were also evaluated. Results showed that the highest essential oil content in seed (%0.277), linalool content (%73.96) and alpha-Pinene content (%9.96) in essential oil with application of 10 ton/ha cattle manure and the maximum gamma-Terpinene content (%5.05) in essential oil with consumption of 15 ton/ha cattle manure were obtained. Nitrogenic biofertilizer also showed significant effects on linalool content and alpha-Pinene content in essential oil (except essential oil content and gamma-Terpinene content). The highest linalool content (%72.79) in essential oil in inoculation with azotobacter and the maximum alpha-Pinene content (%10.30) in essential oil with azospirillum inoculation were obtained. Positive and synergistic interactions were observed between factors on essential oil content and alpha-Pinene content and gamma-Terpinene content in essential oil. Differences between treatments and control were significant, as mentioned characters in treatments of cattle manure and nitrogenic biofertilizer application were more than control. According to the results of this study, the maximum essential oil content and it quality with application of 10 ton/ha cattle manure and inoculation with azotobacter were obtained.

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EFFECTS OF ORGANIC MANURE AND BIOFERTILIZER APPLICATION ON SEED YIELD AND YIELD COMPONENTS IN CORIANDER (*CORIANDRUM SATIVUM*)

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In order to study the effect of organic manure and biofertilizer on seed yield and yield components in coriander (*Coriandrum sativum* L.) contain plant height, umbel no./plant and 1000 seed weight, an experiment was conducted at homand research station in Damavand of Iran in 2010. The factors were cattle manure (5, 10, 15 and 20 ton/ha) and nitrogenic biofertilizer (inoculation with azotobacter, inoculation with azospirillum and inoculation together). The experiment design was factorial experiment in the base of randomized complete blocks design with twelve treatments and three replications. These treatments with a control treatment (without fertilizer) were also evaluated using a randomized complete blocks design with thirteen treatments and three replications. Results showed that the highest plant height, umbel no./plant, 1000 seed weight, and seed yield were obtained with consumption of 15 ton/ha cattle manure. Nitrogenic biofertilizer also showed significant effects on umbel no./plant and seed yield (except plant height and 1000 seed weight). The maximum umbel no./plant were obtained with two treatments of inoculation with azotobacter and inoculation with azospirillum and seed yield were obtained with azospirillum inoculation. There were positive and synergistic interactions between factors. For example, interactions between factors on umbel no./plant. Differences between control and other treatments were significant, as plant height and umbel no. /plant in two treatments of 15 ton/ha cattle manure application and inoculation with azospirillum, and application of 15 ton/ha cattle manure and inoculation together respectively and also, 1000 seed weight and seed yield in treatment of 20 ton/ha cattle manure application and inoculation with azospirillum were higher than control.

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IN VITRO ANTIFUNGAL ACTIVITY OF FIVE MEDICINAL PLANT SPECIES EXTRACTS AGAINST SEVEN POSTHARVEST FUNGI SPECIES

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Some plant extracts are rich source of active chemical compounds and have antifungal effects and can consider as replace for fungicides. In this study, the effectiveness of 5 medicinal plants (*Hyssopus officinalis*, *Foeniculum vulgare*, *Melissa officinalis*, *Olea europaea* and *Thymus vulgaris*) was evaluated against seven postharvest fungi species including *Alternaria alternata*, *Aspergillus niger*, *Fusarium solani*, *Rhizopus stolonifer*, *Penicillium expansum*, *Botrytis cinerea* and *Monilinia* sp. The growth inhibiting effect (GIE) of methanolic, acetonic and water extracts of the plants at the concentrations of 1% and 10% on the vegetative growth of the fungi was investigated by paper disk method on PDA under *in vitro* condition. Results showed that the GIE of extracts was significantly different depending on the plant, extraction method, extract concentration and the fungi. *T. vulgaris*, *O. europaea* and *H. officinalis* were the more effective plants against the fungi growth. Acetonic extracts showed the most GIE. *A. niger*, *Monilinia* sp. and *R. stolonifer* were the less sensitive fungi and *B. cinerea* was the most sensitive ones to the extracts. On the basis of results obtained from the comparison of plant-fungus interactions means, *T. vulgaris* with GIE of 1.64 was the most effective plant on *B. cinerea* [1-11].

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IN VITRO ANTIFUNGAL ACTIVITY OF FOUR MEDICINAL PLANT SPECIES ESSENTIAL OILS AGAINST SEVEN POSTHARVEST FUNGI SPECIES

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In recent years study and use of chemicals from natural sources (particularly of plant resources), which are non-toxic and specific in their action, is gaining considerable attention for exploitation as alternative chemical control measures. In this study, the antifungal effects of essential oils of 4 medicinal plants (*Hyssopus officinalis*, *Foeniculum vulgare*, *Melissa officinalis* and *Thymus vulgaris*) was evaluated against seven postharvest fungi species including *Alternaria alternata*, *Aspergillus niger*, *Fusarium solani*, *Rhizopus stolonifer*, *Penicillium expansum*, *Botrytis cinerea* and *Monilinia* sp. The growth inhibiting effect (GIE) of essential oils at the concentrations of 0.5/1000 and 1.5/1000 on the vegetative growth of the fungi was investigated by paper disk method on PDA under *in vitro* condition. Results showed that the GIE was significantly different for the different plant essential oils. *H. officinalis* and *F. vulgare* were the more effective plants against the fungi growth. Higher concentration of essential oils increased the GIE. *R. stolonifer* and *A. alternata* were the less sensitive fungi and *B. cinerea* was the most sensitive ones to the essential oils [1-9].

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COMPARISON OF THE ESSENTIAL OIL COMPOSITION OF LEAVES AND FLOWERS OF *PHYSOSPERMUM CORNUBIENSE* FROM KASHAN

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Physospermum Cusson genus belongs to Umbelliferae family that has important medicinal and aromatic species. In this investigation, essential oil composition of leaves and flowers of *Physospermum cornubiense* (L.) DC. from Kashan has been studied. This species has natural habitat in Javanan of Kashan. The vegetative and reproductive organs of this species was collected in spring and summer 2011 and dried in shade (at room temperature). Volatile fractions were isolated by hydrodistillation using a Clevenger-type apparatus. The analysis of the oils was performed by using GC and GC-MS. The results showed that, 19 components were identified in the essential oil of leaves of *Physospermum cornubiense*, among them; Germacrene D (%42.11), γ -Cadinene (%5.54) and Phytol (%4.79) were the major compounds. 38 components were characterized in the essential oil of flowers of *Physospermum cornubiense*, among them; Germacrene D (%52.88), Caryophyllene (%7.73) and Nonadecane (%2.38) were the major compounds.

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COMPARISON OF *T. CARAMANICUS* JALAS. ESSENTIAL OIL PERCENTAGE AND MAIN COMPONENTS IN HABITAT AND FIELD CONDITIONS

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In order to compare essential oil percentage and main components of *T. caramanicus* Jalas. in natural habitat and field condition, an experiment was conducted during 2005 in Esfahan province. For this reason by referring to *T. caramanicus* habitat, Gardaneh Khansar, plant cuttings were prepared. Then the cuttings were cultivated in Gabiz station by a Randomized Complete Block design with 3 replications. The aerial parts of plants were collected at the middle of flowering in both field and habitat. Then air dried flowering stems were submitted to hydrodistillation using a Clevenger type apparatus according to the method recommended in British Pharmacopoeia [1]. The essential oil was analyzed by combination of GC-FID and GC-MS [2,3]. The total yields of oils based on dry weight were 1.35% and 1.41% in habitat and field conditions, respectively with no significant differences. Fifteen components were identified in essential oils in two situations which Carvacrol was the dominant component. The amount of it was higher in habitat (90.21%) in comparison with field (74.64%) with a significant difference. On the other hand Thymol had a higher amount in field condition (18.51%) as compared with habitat (0.97%). *p*-cymene, 1, 8-Cineole, γ -Terpinene and Borneol were the other major components in oil. Correlation coefficients showed that Carvacrol had a positive correlation with γ -Terpinene and a negative correlation with Thymol. In conclusion *T. caramanicus* is rich of Carvacrol component and in habitat condition the amount of this dominant component is higher than field condition. On the other hand the kind of essential oil components are same between habitat and field conditions and the only different is about their quantity.

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THE EFFECTS OF *HYPERICUM PERFORATUM* ON WOUND REPAIR AND SCAR OF CAESAREAN

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The scar represents an abnormal, exaggerated healing response after skin injury and may cause pain, pruritus, contractures, hindrance to movement and other functional impairments. Current treatments of therapeutic approaches to scar management are associated with high rates of recurrence and can be expensive or painful. *Hypericum perforatum* has long been used for healing of wounds in the Iranian traditional medicine. Medicine, *H. perforatum* is used for wound healing. But there is limited clinical research supporting this practice. Thus, the aim of this study was to determine the effects of *Hypericum perforatum* on wound healing and hypertrophic scar. This study was a randomized, double-blind clinical trial study. The study was conducted in Samen-OI-Aemmeh (Pbuh) Hospital in Mashhad, Iran. The participants included 144 eligible women with caesarean childbirth. The participants were randomly assigned to 3 groups. The treatment and placebo groups applied *H. perforatum* or placebo ointment 3 times a day for 16 days based on consecutive coded ointments. The control group remained without any intervention postoperatively. Wound healing was assessed on the 10th day post caesarean using the REEDA scale (REEDA stands for redness, edema, ecchymosis, discharge, and approximation), which had criteria including redness, edema, ecchymosis, discharge, and approximation. On the 40th day, the degree of scarring was assessed using the Vancouver scar scale including pigmentation, height, pliability, and vascularity⁷. The subjects were also asked some questions about pain by using the Visual Analogue Scale and pruritus of scar.

The mean age of all the study subjects was 23.50±4.03 and mean parity was 1.23±.48. There were significant differences in wound healing on the 10th day ($p < .05$) and scar formation on the 40th day post partum ($p < .0001$) between treatment group with placebo and control groups. However, the placebo group had no differences in wound healing ($p < .93$) and scar formation ($p < .11$) with the control group. In addition, significantly lower pain and pruritus were reported by the treatment group compared with the placebo and control groups on the 40th day post-partum. Topical application of *H. perforatum* is safe and can facilitate caesarean wound healing and minimize formation of scar and its pain and pruritus [1-4].

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ANTHOCYANINE CONTENT OF DIFFERENT IRANIAN POMEGRANATE CULTIVARS

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Pomegranate (*Punica granatum* L.), is one of the major agronomic productions of Iran, which has been used in Iranian traditional medicine for many centuries [1]. It has a high antioxidant activity and is effective in the prevention of atherosclerosis [2]. This study determines the anthocyanine content of 10 different Iranian pomegranate cultivars. Vanillin assay method was used to determine anthocyanine content in the samples. Different catechine concentrations (100, 150, 200, 250, 300, 350 µg/mL) were prepared to calibration. The results show that soweet alac cultivar with 3.89 mg Catechin/g extract had the highest content of anthocyanine while sweet white peel cultivar with the 1.52 mg Catechin/g extract had the lowest content. Thus soweet alac cultivar as a source of anthocyanine can introduce whith its health promoting effects particularly lipid peroxidation in cell or liposomal membranes.

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IRANIAN DIFFERENT SESAME SEEDS FATTY ACID PROFILE

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Sesame (*Sesamum indicum* L.) is known as one of the world's most important oil seed crops and contain 50-60% oil [1]. sesame seed flour is a good source of essential amino acid such as methionine, lysine, and cysteine [2]. The oil content, fatty acid profile and oxidizability value of five sesame cultivars including Branching Naz, Darab, Karaj, Dezful and Black sesame were investigated by gas chromatography. The seeds oil content varied from 43±0.28 to 47±0.41% with the average content of 44.4±1.87%. Darab and Black sesame cultivars had the highest and lowest oil content respectively. Also Branching Naz, Dezful and Karaj cultivars with 44 % had the similar oil content.

The major detected sesame fatty acids were oleic, linolec, palmitic and stearic acid. Moreover Dazful and Black sesame had the maximum and minimum content of oxidizability value respectively. Consequently sesame cultivars used in this study are commercially important in oil production. Blak sesame and Branchin Naz had the maximum and minimum content of unsaturated/saturated fatty acids and also oxidizability value respectively among the other studied sesame seed cultivars.

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IN VITRO CYTOTOXIC ACTIVITY AND ANTIOXIDANT PROPERTIES OF NINE *SALVIA* SPECIES FROM IRAN: A COMPARATIVE STUDY

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Natural products historically have been used for a long time for their therapeutic properties. It has been reported that among the 155 small molecular anticancer drugs developed from 1940s to June 2006, 47% of them are either natural products or their derivatives [1]. In this study, methanolic extract of nine *Salvia* species including *Salvia sclarea*, *S. atropatana*, *S. sahendica*, *S. hydrangea*, *S. xanthocheila*, *S. macrosiphon*, *S. glutinosa*, *S. choleroleuca* and *S. ceratophylla* were investigated for their cytotoxicity, antioxidant activities, total phenolic and total flavonoid content.

The SRB cytotoxicity assay was carried out on ten cancer cell lines including human melanoma (C32), renal cell adenocarcinoma (ACHN), lung carcinoma large cell (COR-L23), malignant melanoma (A375), colorectal adenocarcinoma (CaCO-2), hepatocellular carcinoma (Huh-7D12), human caucasian lung carcinoma (A549), human breast cancer (MCF-7) and hormone dependent prostate carcinoma (LNCaP). Antioxidant activities were examined using DPPH (2,2-diphenyl-1-picrylhydrazyl), ABTS (2,2'-azino-bis(3-ethylbenzthiazoline-6-sulphonic acid)) and FRAP (ferric reducing activity power) assays. The results have shown that the methanol extract of *S. glutinosa* had the highest DPPH radical scavenging activity with an IC₅₀ value of 3.24 µg/ml followed by *S. sclarea* (4.78 µg/ml), *S. hydrangea* (3.54 µg/ml) and *S. ceratophylla* (3.54 µg/ml). Also, *S. glutinosa* had the highest ABTS and FRAP antioxidant activities. However, methanol extract from *S. hydrangea* has shown the most potent cytotoxicity on all different cancer cell lines with IC₅₀ of 37.29, 43.56, 42.28, 47.10, 121.17, 62.63, 111.48, 31.59 and 67.53 µg/ml for MCF-7, C32, ACHN, COR-L23, CaCO-2, A549, Huh-7D12, LNCaP and A375, respectively.

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INVESTIGATION OF THE EFFECT OF NUTRIENT RESOURCES AND WEED CONTROL ON QUALITATIVE AND QUANTITATIVE CRITERIA OF CAT TYME (*TEUCRIUM POLIUM*)

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In order to investigate the effects of nutrient resources and weed management on qualitative and quantitative criteria of cat tyme (*Teucrium polium*), an experiment was conducted as split plot based on a complete randomized block design with 3 replications at the agricultural research station, Ferdowsi University of Mashhad, Iran, during the years 2008 and 2009. Treatments included different nutrient resources: manure fertilizer (10 ton/ha), chemical fertilizer (based on the amount of macro elements existing in manure fertilizer), Nitroxin biological fertilizer (4 l/ha), Manure fertilizer (10 ton/ha) plus chemical fertilizer (based on the amount of macro elements existing in manure fertilizer), Nitroxin biological fertilizer (4 l/ha) plus manure fertilizer (10 ton/ha) and control (not fertilizer) under weed infested and weed free conditions. Weed management was located in main plots and nutrient resource in sub plots. In the first year, the highest height of plant was observed in manure + chemical fertilizer treatment (26.3 cm) and the lowest in manure + Nitroxin fertilizer treatment (14.8 cm). The results indicated that there was not significant different between treatments for shoot and crown diameter of cat tyme, in the first year. But in the second year of experiment, type of nutrient resource and weed management affected shoot and diameter significantly. The highest and the lowest shoot number was observed in manure + chemical fertilizer under weed free condition (88.5) and control under weed infested condition (38.2), respectively. The highest and the lowest diameter of *Teucrium polium* were obtained in manure fertilizer (48.4cm) and control (28.6 cm) under weed free condition treatments, respectively. In the first year, the highest of leaf and flower dry matter was observed in manure + chemical fertilizer treatment under weed free condition with 2889 kg/ha. In second year, maximum yield was obtained in Nitroxin biological fertilizer under weed free condition (3261 kg/ha). In the first year, the maximum percentage and yield of essential oil was obtained in chemical fertilizer and manure+Nitroxin treatments under weed free condition. In the second year, the highest essential oil percentage was observed in Nitroxin and manure + chemical fertilizer treatments under weed infested condition [1,2].

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TREATMENT OF RABBIT VAGINAL CANDIDIASIS BY ETHANOLIC EXTRACT OF PROPOLIS (EEP)

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Propolis is a resinous substance collected by honeybees from buds and leaves of trees and plants, mixing with pollen as well as enzymes secreted by bees. Propolis, known in folk medicine since ancient times, has attracted much attention in recent years as a useful ingredient applied in medicine, domestic products, and food products, since it possesses various biological properties including antimicrobial, antioxidant, and antiulcer properties. The antimicrobial property of propolis has been widely reported. Vaginal candidiasis is a frequent and common distressing disease affecting up to 75% of the women of fertile age; most of these women have recurrent episodes. This study was aimed at assessing the anti-fungal activity of EEP in an experimental infection of vaginal candidiasis. Ethanolic extract of propolis from beehives have been shown to have antimicrobial and antifungal activities. In this study, propolis was obtained from beehives in West Azarbaijan. Propolis, grated after cooling, was extracted for 24 h with 70% ethanol (1:10, w/v) at room temperature. The extract was evaporated to dryness. Concentrations of 1000ppm, 500ppm, 250ppm and 125ppm of propolis extracts in saline are prepared. Twelve albino rabbits were used for experimental infections. Animals were randomly divided into three groups (n=4): a treated group with nystatin, the Ethanolic Extract of Propolis (EEP) group, and an untreated group. After topical analgesia, vaginas of animals were inoculated twice at a 24 h with 10 μ l of 10⁹ cell/ml of *Candida albicans*. Cell suspensions were administered from a mechanical pipette into the vaginal lumen, close to the cervix. After 2 days, all groups showed candidiasis symptoms. The *in vivo* activity of EEP was assessed. Differences between ethanolic extract, nystatin and saline treated rabbits were evaluated by macroscopic appearance daily to 20 days. All of the doses of EEP were not effective on infection healing. In between all of groups, the results showed that dose of 1000ppm of EEP were the most effective in treatment of experimental vaginal candidiasis. No effect was recorded after 20 days treatment of infection for others doses of EEP that used in this study. There is a clear demand for finding a new therapeutic approach in this era of increasing spreading of antimicrobial drug resistance and re-emergence of infectious diseases. Recently the use of *propolis* as a new approach in antifungal therapy has been proposed. This natural compound appears to be effective *in vitro* against multidrug resistant *Candida* and *in vivo* against mucosal candidiasis [1-4].

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INCREASED OF DIGITOXIN BIOSYNTHESIS IN MEDIA AND EFFECTS IN ISOLATED RAT ATRIUM

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Cardiac glycosides are drugs used in treatment of congestive heart failure and cardiac arrhythmia. These glycosides are found as secondary metabolites in several plants. Cardiac glycosides work by inhibiting the Na⁺/K⁺ pump. This causes an increase in the level of sodium ions in myocytes, which then leads to a rise in the level of calcium ions. This inhibition increases the amount of Ca²⁺ ions available for contraction of the heart muscle, improves cardiac output and reduces distention of the heart. They have an anti-arrhythmic effect by prolonging the refractory period of the AV node (Atrioventricular node), reducing the number of impulses reaching the ventricles. Cardiac glycosides are an important class of naturally occurring drugs whose actions include both beneficial and toxic effects on heart. Both therapeutic and toxic effects of digitalis are due to myocardial Ca²⁺ loading. Digitoxine is a cardiac glycoside which can be purified on cardiac glycosides extracted from *Digitalis purpurea*. In this study; we cultured *Digitalis purpurea* in a media (Callus) and then effect of digitoxine was studied on arrhythmia in spontaneously beating isolated rat atrium. Three media types were used; control which received Digitoxine (Positive Control), extracted digitoxine in media without hormone, and extracted digitoxine hormone media. Effects of digitoxin were investigated following extraction of digitoxine produced by each media. Digitoxine caused a decrease in contraction rate of the atrium (1-27%) and an increase in contraction force (4-29%). Cardiac glycosides significantly increased time of arrhythmia onset when it was added in organ bath Cardiac glycosides alone produced arrhythmia at 12 \pm 2 minutes and either a systole or standstill at 25 \pm 3 minutes. These findings indicated that hormone addition to callus produces higher concentration of digitoxine. Moreover; our results suggest that application of hormone in callus media increases digitoxine biosynthesis 3.22time in media without hormone. The results would be useful for increasing biosynthesis of digitalis for further medical applications.

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INVESTIGATION ON CYTOTOXIC EFFECT OF SELECTED PLANTS FROM IRANIAN TRADITIONAL MEDICINE

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Cancer is a general term applied to a series of malignant diseases which may affect many different parts of the body [1]. In most developed countries, cancer is the second largest cause of death after cardiovascular disease [2]. The accepted modality for cancer treatment involves surgery, radiation and drugs, singly or in combination [3]. Medicinal plant drug discovery continues to provide new and important leads against various pharmacological targets including cancer, HIV/AIDS, Alzheimer's, malaria, and pain [4]. The value of natural products in this regard can be assessed using 3 criteria: (a) the rate of introduction of new chemical entities of wide structural diversity, (b) the number of diseases treated or prevented by these substances, and (c) their frequency of use in the treatment of disease [5]. Traditional medicine over the years has proved to be an invaluable guide in drug discovery and Iran has a long history in the field of traditional medicine [1]. Four books, Al-Qanun fi al-Tibb (Avicenna), al-havi (Razes), Makhzanol advieh (Aghili khorasani) and Ekhtiarat Badi'eh (Ali ebne hosein Ansari) from Iranian traditional medicine (ITM) were studied. The term "cancer" in these books and even in other ITM's references has been represented as /orâme salbe/ and /orâme bârede/. Upon the frequency use of the plants in treatment of various cancers, ten plants were selected. The plants were collected, dried in shadow and powdered. The methanolic extracts of these plants were prepared and their cytotoxicity activities were screened against MCF7, HepG2, MDBK, HT-29 and A549. Methanolic extract of /oshtorghâz/ showed better cytotoxic activity.

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EFFECT OF LIGHT TREATMENT ON SEED GERMINATION FACTORS IN TWO ECOTYPE OH *THYMUS DAENENESIS*

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The genus *Thymus* L. belongs to lamiaceae family and Mediterranean region can be described as the center of this genus. *Th. daenensis* is one of the four endemic species of Iran.. In order to survey the effects of light including light (24h), darkness (24h) and light/darkness (16h/8h) on germination in two ecotypes of *Th. daenensis*, a completely randomized design was implemented at three replications. Seeds were placed in plastic Petri dishes (25 seeds/petri dish) on top of one sheet of moistened filter paper and placed in a growth chamber. Germination conditions were adjusted as 24°C and 70% humidity for ten days. Measured traits were: germination percentage, radicle length, Hypocotyle length, fresh and dry weight of seedlings, mean germination time (MGT), germination rate and seed vigor index. Data analysis was carried out with SAS software. Mean comparison was performed with Duncan's test. Results showed significant differences (P<0.01) among treatments. In darkness condition seedling showed etiolated symptoms. Hypocotyle was longer and radicle was shorter in comparison with other treatments and radicle/ Hypocotyle relation reduced. In contrast, radicle/ Hypocotyle relation increased in light and light/darkness condition. Darkness condition caused reduction in dry/fresh relation. Light increased germination rate in two ecotypes and the highest germination rate was observed in Damavand ecotype. Light/darkness treatment increased seed vigor index and Kordestan ecotype showed highest seed vigor index. Damavand ecotype showed better performance in light condition, but germination factors was better in Kordestan ecotype under light/dark condition. There was no variation in germination percentage in all treatments. In general, germination of *Th. daenensis* was independent of light but pretreatment with light could increase germination rate in *Th. daenensis* and shorten germination time.

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ANTIBACTERIAL ACTIVITIES AND CHEMICAL COMPOSITION OF ESSENTIAL OILS OF *FUMARIA VAILLANTII* IN KERMAN PROVINCE

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In order to identify chemical composition and antimicrobial activity of essential oil of *Fumaria vaillantii*, the leaves with young branches of this plants which grows in a village in Kerman Province at full flowering stage in May 2011 were collected. The samples were cleaned and then drying in the shade, making essential oil hydrodistillation method was performed. The main oil content from the plants of *Fumaria vaillantii* was 0.25% that essential oil was analyzed by capillary gas chromatography (GC) using flame ionization (FID) and capillary gas chromatography coupled mass spectrometry (GC/MS) for detection. Eighty compounds were identified in the essential oil of *Fumaria vaillantii* that concluded 99.62% of the total oil. The major components were Parfimidine (18.94%), Fumaricine (16.30%), Thymol (12.45%) and Fumaritine (10.78%). For study of antibacterial activity of the oil sample, the essential oil tested against 9 bacteria by disc diffusion method. The antibacterial effects of this essential oil was determined against three gram positive bacteria *Staphylococcus aureus* (PTCC=1431) and *Staphylococcus epidermidis* (PTCC=1436) *Streptococcus faecalis* (PTCC=1237) and six gram negative bacteria *Pseudomonas aeruginosa* (PTCC=11430), *Shigella flexneri* (PTCC=1716), *Klebsiella pneumoniae* (PTCC=1053), *Salmonella typhi* (PTCC=1609), *Serratia marcescens* (1187) and *Escherichia coli* (PTCC=1533). The results showed the essential oil of *Fumaria vaillantii* had strong anti-bacterial effects. The relatively high amount of Thymol in the essential oil of *Fumaria vaillantii* showed that could have the medicinal uses.

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IN VITRO ANTIMICROBIAL AND PHYTOCHEMICAL ACTIVITIES OF *TEUCRIUM POLIUM* LEAF OIL

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The *in vitro* antimicrobial and phytochemical activities of leaf extract of *Teucrium polium* isolated from Kerman province in 2011 was investigated. The main oil content of *Teucrium polium* was 0.75%. Essential oil was analyzed by capillary gas chromatography (GC) using flame ionization (FID) and capillary gas chromatography coupled mass spectrometry (GC/MS). Twenty-eight compounds were identified in the essential oil of *Teucrium polium* that concluded 99.75% of the total oil. The major components were α -Pinene (12.52%), Linalool (10.63%) and Caryophyllene oxide (9.69%). For study of antimicrobial activity of the oil sample, the essential oil tested against 9 bacteria by disc diffusion method. The antimicrobial effects of this essential oil was determined against three gram positive bacteria *Staphylococcus aureus* (PTCC=1431) and *Staphylococcus epidermidis* (PTCC=1436) *Streptococcus faecalis* (PTCC=1237) and six gram negative bacteria *Pseudomonas aeruginosa* (PTCC=11430), *Shigella flexneri* (PTCC=1716), *Klebsiella pneumoniae* (PTCC=1053), *Salmonella typhi* (PTCC=1609), *Serratia marcescens* (1187) and *Escherichia coli* (PTCC=1533). The results showed the essential oil of *Teucrium polium* had strong anti-bacterial effects. This inhibitory effect in *Staphylococcus aureus* and *Escherichia coli* were the best respectively. The minimum inhibitory observed in *Streptococcus faecalis*. These inhibitory effects have been relativities of α -Pinene and Linalool.

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**BIOLOGICAL ACTIVITY AND COMPOSITION OF ESSENTIAL OIL OF
SALVIA SHARIFII RECH. F. & ESFAN.**

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Salvia sharifii Rech. f. & esfan. is an endemic plant that growing in south of Iran. Persian name for the *S. sharifii* is “Maryam goli jonoobi” and in the south of Iran, different preparations of this plant e.g., decoctions, infusions and powders, are used as antiseptic, carminative, digestive and analgesic [1].

GC and GC/MS analysis of the plant essential oil resulted in the identification of 35 compounds representing 95.01% of the oil. Linalool (32.9%), hexyl isolavaterate (15.4%) and Hexyl 2-methyl butanoate (10.9%) were detected as the major components consisting 59.2% of the oil. The essential oil showed good antioxidant activities, (IC₅₀ = 16.8 µg/ml) which correlated well with the total phenolic content (0.390±0.004 mg catechin /g essential oil) of the oil (R₂: 0.822, p < 0.0001). It also inhibited the growth of all tested bacteria and fungi. The results of antitumor activity show that this plant exhibit antitumor properties and it show enhanced inhibitory activity compared to synthetic control compounds such as cisplatin and oxaplatin.

Cytotoxic and antimicrobial activities of *S. sharifii* essential oils

compound	Conc. (M)	IC ₅₀ (µg/ml)		Microorganism	MIC ^a	MIC of ref. ^b	ZI ^c	ZI of Ref. ^d
		HT-29	T47D					
<i>S. Sharifi</i>	0.1	45.09±03.09	100.56±09.81	<i>Bacillus pumilus</i>	256	64	11.6 ± 1.1	16.3 ± 0.3
	0.01	168.09±11.90	209.81±18.21	<i>Escherichia coli</i>	32	16	15.4 ± 0.5	16 ± 0
	0.001	391.09±21.09	430.09±13.09	<i>Kocuria varians</i>	128	32	10.6 ± 1.5	17.6 ± 0.5
<i>Cisplatin</i>	0.1	125.71±8.09	170.59±9.43	<i>Listeria monocytogenes</i>	128	16	14.5 ± 0.5	14.3 ± 0.5
	0.01	197.06±17.09	211.34±17.05	<i>Pseudomonas aeruginosa</i>	64	8	13.6 ± 0.5	16.3 ± 0.1
	0.001	243.09±12.24	277.48±20.66	<i>Salmonella typhi</i>	256	64	16.3 ± 0.5	21.3 ± 0.5
<i>Oxaplatin</i>	0.1	304.12±01.09	212.31±06.99	<i>Aspergillus flavus</i>	256	64	11.3 ± 1.1	19.3 ± 0.5
	0.01	409.98±09.89	290.05±13.06	<i>Candida glabrata</i>	256	64	9.1 ± 0.3	19 ± 0
	0.001	527.67±18.91	359.09±14.23	<i>Aspergillus niger</i>	128	32	10 ± 1	22 ± 0

^a MIC: Minimal inhibitory concentration(µg/ml). ^b Ampicillin, Tetracycline and Fluconazole were used as references for Gram-positive, Gram-negative bacteria and fungus, respectively. ^c ZI: Zone of inhibition(mm). ^d Ampicillin, gentamicin and ketonazole (10 µg/disc) were used as references for Gram-positive, Gram-negative bacteria and fungus, respectively.

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EFFECT OF FOLIAR APPLICATION OF MICROELEMENTS ON SOME MORPHOLOGICAL CHARACTERISTICS OF PURPLE CONEFLOWER IN WATER STRESS CONDITION

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Purple Coneflower by scientific name of *Echinacea purpurea* (L.) Moench is a perennial and grassy plant [1]. All parts of this plant including root and shoot have effective material which have anti fungi, bacteria and virus effect and prevention and cold treatment drugs are obtained from it [2]. In order to study the effects of foliar application of zinc sulfate and manganese sulfate on some morphological characteristics of *Purple coneflower* under water stress, an experiment was carried out by factorial method on the base of RCBD with three replication in the agricultural research station of Islamic Azad University, Tabriz Branch in 1388-89. Experimental treatments included water stress as the main factor on 3 levels (irrigate after 70mm evapotranspiration from class A basin, irrigate after 120mm evapotranspiration from class A basin and irrigate after 170mm evapotranspiration from class A basin, Secondary factor as foliar application of microelements in 3 levels (not application, application of zinc sulfate and manganese sulfate). The result showed that foliar application of zinc sulfate and manganese sulfate had meaningful effect on biological yield, stem diameter and Zinc and manganese content of shoot of Purple coneflower. Application of water stress in Purple coneflower resulted 20.79% decrease in stem diameter, 41.46% in biological yield, 34.03% in Zinc rate of shoot and 51.32% in manganese content of shoot. Microelement application of Zinc and Mn caused a rise of biological yield in all of level stress condition and the most effect on biological yield obtained of foliar application of Zinc and Mn under full irrigate condition was equal to 38.55 and 38.05% respectively.

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National Congress on Medicinal Plants
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TOXICITY OF *CARUM COPTICUM* AND *CUMINUM CYMINUM* ON *SITOPHILUS GRANARIUS*
(COLEOPTERA: CURCULIONIDAE)

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Sitophilus granarius L. is a serious and primary pest, able to feed on whole and undamaged cereal grains in grain storage facilities [1]. Laboratory bioassays were conducted to assess toxicity of *Carum copticum* L. and *Cuminum cyminum* L. as powder and essential oil against adults of *S. granarius*. Wheat grains were poured to glass vials and treated with 300, 1100, 1900, 2700, and 3500 of *C. copticum* plant powder and 113.3, 226.6, 453.3, 680 and 906.7 mg/kg of essential oil with four replications. In the case of *C. cyminum*, 300, 950, 1600, 2250 and 2900 mg/kg of powder and 114.5, 229.1, 458.2, 687.3 and 916.4 mg/kg of essential oil was applied. Subsequently, 25 adults of *S. granarius* were introduced to each vial and glass lids were screwed tightly. Experiments were conducted at 27±1°C and 55±5% r.h. in continuous darkness. The mortality was counted after 2 and 7 d of exposure for essential oil and powder, respectively. The LC₅₀ values and 95% confidence intervals for *C. copticum* powder and essential oil were 1128 (944.8-1319) and 578.3 (520.9-648.7) mg/kg, respectively. For *C. cyminum* powder and essential oil, the lethal concentration caused 50% mortality was 673.344 (552.8-790.6) and 472.27 (426.1-524.7) mg/kg, respectively. Results indicated that plant powder has less insecticidal efficacy against *S. granarius*, even after 7-d of exposure. in agreement with findings of Tapondjou et al. [2] That plant powders has less toxicity than essential oils. In addition, *C. cyminum* plant materials were more effective than *C. copticum*. However, more experiments are necessary to confirm the results.

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ESSENTIAL OIL CONTENT AND HERBAGE YIELD OF SUMMER SAVORY (*SATUREJA HORTENSIS* L.) GROWN UNDER DIFFERENT LEVELS OF NITROGEN IN THE FIELD

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The genus *Satureja* L. (*Lamiaceae*) comprises more than 200 species of aromatic herbs and shrubs, widely distributed in the Mediterranean region. This genus in flora of Iran is represented by 12 species distributed commonly in Rocky Mountains. *Satureja* species have economic and medicinal importance because of their high essential oil content. Essential oil is extensively used in the food, flavor, perfume, cosmetic and pharmaceutical industries. Extracts and essential oils of Summer savory have antioxidant, antibacterial and antifungal activities. In order to investigation of Herbage yield and essential oil content of Summer savory (*Satureja hortensis* L.) grown under different levels of nitrogen in the field, a field experiment was conducted in Sari Agricultural Sciences and Natural Resources University with 5 levels of nitrogen fertilizer including 0, 50, 100, 150 and 200 Kg/ha during 2010. This experiment was carried out in randomized complete block design with three replications. The plants were investigated in full flowering stage. Aerial parts of the plant were subjected to Hydro-distillation for 3 h using a Clevenger-type apparatus to produce essential oil. The results showed that a significant difference ($p < 0.01$) among nitrogen fertilizer rates application on leaf dry yield, stem dry yield, root dry yield and shoot dry yield. Mean comparison showed that the highest dry leaf yield (1884.6 Kg/ha), dry stem yield (1293.07 Kg/ha) and shoot dry yield (3177.7 Kg/ha) was obtained with the N rate of 200 kg/h. But the highest dry root yield (219.9 and 216.5 Kg/ha) were achieved under 100 and 150 kg N/ha. The effect of nitrogen doses application was found to be statistically significant at %5 level for essential oil content and %1 level essential oil yield. According to result of this research, The highest essential oil content (1.68 and 1.39) were obtained with the N rates of 0 and 50 Kg/ha. The highest essential oil yield (32.71, 29.23 and 26.19 Kg/ha) were obtained from the 100, 0 and 50 Kg/ha nitrogen application, respectively. The results of this study showed that nitrogen fertilizer application up to 200 kg/h for achieved the maximum herbage yield and nitrogen fertilizer application in lower rates and non- nitrogen fertilizer for achieved the highest essential oil yield and essential oil content in Sari climatic condition was suitable.

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Kish Island



IN VITRO ANTIOXIDANT ACTIVITY OF METHALONIC FLOWER AND HULL EXTRACT OF *AMYGDALUS.ORIENTALIS* L.

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In-vitro antioxidant activity of methanolic flower and hull extract of *Amygdalus orientalis* was determined by DPPH free radical scavenging assay. The Reducing power of extracts was also determined. All the analysis was made with the use of UV-Visible Spectrophotometer (biowave s2100 England). The methanolic hull and flowers extracts of *Amygdalus.orientalis* had very significant DPPH (1, 1-diphenyl-2-picryl-hydrazyl) radical scavenging activity compared to standard antioxidant. The DPPH radical scavenging activity of the extract was increased with the increasing phenol compound. In DPPH free radical scavenging assay IC50 value of hull and flowers extracts of *Amygdalus.orientalis* was found to be 95.79 µg/mL. The results showed that the extracts have a potential source of antioxidants of natural origin.

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STUDY ON HYSTOMORPHOLOGIC AND MACROSCOPIC EFFECT OF *COMMIPHORA* *OPOBALSOMUM* ON BURNED WOUND HEALING IN RATS.

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Modern medicine is rooted in ethnobotanical traditions using indigenous flora to treat symptoms of human diseases or to improve specific aspects of the body condition. Nowadays faster healing wounds is more challenging to researchers. The aim of the present study was to histopathological evaluate of the effect of *Commiphora opobalsomum* on healing of burned wound in rats.

Forty male Wistar rats were randomly assigned into two groups (control and experimental) of twenty animals each. All the animals induced ketamin and diazepam anesthesia and shaved back. Grade III burned wound was induced on the back of all animals. The experimental group was given extract of *Commiphora opobalsomum* twice a day. Animals in control group had basal ointment as well. Animals scarified on the days of 3, 7, 14 and 21st, however taking photograph was performed on such days.

Histopathological studies and comparison of wound healing among the groups were carried out considering more effective agents on wound healing including proliferation of fibroblasts, angiogenesis, re-epithelialization and collagen organization in healing tissue. Significant differences among the groups were determined by one-way analysis of variance followed by Bonferroni post-test. Statistical significance was considered at p<0.05. The area of the wounds measured and there was a significant different between control and experimental group in size of the wound in all days of sampling that reveal *Commiphora opobalsomum* has strongly positive effect on burned wounds.

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THE INFLUENCE OF COMPOST ON ANTIOXIDANT ACTIVITIES AND QUALITY OF HOT PEPPER (*CAPSICUM ANNUUM* L.)

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The effects of applications of composts on antioxidant activities and quality of hot pepper (*capsicum annum* L.) were evaluated under field conditions. Treatments consisted of four levels of compost (0, 5, 10 and 15 t ha⁻¹). The experiment was designed in randomized block design with three replications. Fruit antioxidant compounds (antioxidant activity, total phenolic, total flavonoid and β-carotene) were influenced by compost treatments. But, no significant difference was found in capsaicin content between compost and control treatments. The highest total phenolic and β-carotene were obtained in plants treated with 10 ton ha⁻¹ of compost, while the lowest values were recorded in the control. Ascorbic acid and carbohydrate content significantly increased in response to compost treatments and the highest values were obtained from 15 t ha⁻¹ of treatment. Thus, these results showed that compost has strong impact on antioxidant compounds and quality of pepper plants under field conditions.



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16, 17 May 2012
Kish Island



EFFECT OF FULVIC ACID ON ANTIOXIDANT ACTIVITIES AND QUALITY OF HOT PEPPER
(*CAPSICUM ANNUM L.*)

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The present investigation was undertaken to evaluate the effect of fulvic acid (FA) on antioxidant compounds and fruit quality of pepper under field conditions. Treatments consisted of five levels of fulvic acid (0, 25, 100, 175 and 250 mg kg⁻¹). The results indicated that fruit antioxidant compounds (antioxidant activity, total phenolic, carbohydrate, capsaicin and carotenoids contents) were influenced by fulvic acid, but total flavonoid and ascorbic acid contents were not affected significantly by fulvic acid treatments applications. FA applied to at 25 mg kg⁻¹ resulted to the highest carbohydrate content, lycopene and β-carotene contents, while the lowest values were recorded in the control. Fulvic acid treatments positively affected fruit quality (total soluble solids, titratable acidity and ascorbic acid). Total soluble solids and titratable acidity significantly increased in response to FA treatments. Moreover, the pH of the fruits was significantly lower when treated with fulvic acid.

QUANTIFICATION OF SAFFRON METABOLITS CROCINS, PICROCROCIN AND SAFRANAL
FOR QUALITY DETERMINATION UNDER DIFFERENT ENVIRONMENTAL ZANJAN PROVINCE
CONDITIONS

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Saffron is cultivated about 11 acres in Zanjan province and it is compatible with the Zanjan climate. Saffron is a perennial crop well adapted to arid and semi-arid lands. It is native to the Mediterranean environment that is characterized by cool to cold winters, with warm dry summers and very little rainfall. Saffron can be grown on soils varying from sandy to well-drained clay loams. It is the most expensive spice in the world [2,3]. The most important saffron components crocins, picrocrocin, and safranal which are respectively responsible for its color, taste and odor [5]. Saffron quality depends on the concentration of its three major metabolites providing the unique color and flavor to the stigmas. Picrocrocin is considered to be the main bitter principle of saffron. It is a monoterpene glycoside precursor of safranal, the major volatile oil responsible for the aroma [4]. The UV absorption maximum for picrocrocin is 254 nm [1]. In this study, saffron samples from different altitudes and geographical situations, Taroum with altitude of 1100m and semi-tropical climate (T), Mahneshan with altitude of 1350m and semi-cold wet climate (M), Abhar with altitude of 1540m and cold semi-arid climate (A) and Zanjan with altitude of 1663 m and super-cold semi-arid climate (Z) were collected from 3 year-old saffron plants in 2009. Crocin, Picrocrocin and Safranal, major metabolites, were quantified based on 259-2 national standard spectrophotometer procedure, in 440 nm, 257 nm and 330 nm, respectively. The results of quality tests, indicated that least content of crocin based on the dry matter in four climates were 205, 138.2, 224 and 205 (maximum absorption in 440nm) and least content of picrocrocin based on the dry matter in four climates were 70.7, 64.8, 81 and 80 (maximum absorption in 257nm) and safranal values were 35, 40, 32 and 32, respectively for T, M, A and Z climates. The quality of saffron in Abhar and Zanjan (cold climates) was more qualitative than Taroum and Mahneshan. The safranal in cold climates were lower than warm climates.

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STUDY OF ANTIOXIDANT AND ANTIMICROBIAL EFFECTS OF ETHANOLIC, METHANOLIC AND AQUEOUS EXTRACTS OF SOME SPECIES OF IRANIAN PAPAVER L.

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Papaver L. is the largest genus to the family Papaveraceae. These plants for isoquinolin alkaloids are considerable in medical researches. Phenolic compounds are often related to the antioxidant activity of plants due to their ability to adsorb and/or denaturalize free radicals by means of quenching unpaired oxygen radicals or decomposing peroxides. In this research antimicrobial effects of ethanolic, methanolic and aqueous extracts obtained from aerial parts (leaf-stem), flower and root of some species of *Papaver* on growth of some of microorganisms including *Staphylococcus aureus*, *Streptococcus agalactiae*, *Streptococcus pyogenes*, *Bacillus anthracis*, *Kelebsiella pneumoniae* and *Pseudomonas aeruginosa* were investigated. Also the *Papaver* species are good sources for antioxidant function because of having antocyanin in their petals. In this study, ethanolic and methanolic extracts of some *Papaver* species had high antioxidant effects

Plants samples has been collected from natural habitats and identified. For study of anatomical effects root, stem leaf and flower organs form each species were dried and powdered separately in dark and shadow. These powders were included in ethanol, methanol and distilled water with ratio of 1:9. The extracts were filtered after 24 hours and sterile with tandalization. The evaluation diameter of the inhibitory zone and MIC method were used for assessment.

The results showed that ethanolic and methanolic extracts have strongest antimicrobial effect on microorganism relative to aqueous extracts. Between six plants examined, various parts of *P. argemon* ssp. *minus* had highest inhibitory effect on the microorganisms. After this Plant, strongest antimicrobial effect has seen in

Various parts of root, aerial parts and flower of *P.chelidoniifolium*. Ethanolic extracts obtained from various parts of plants showed strongest antimicrobial effect on the microorganism, especially on Gram-positive bacteria. Aqueous extracts obtained from flower, aerial parts and root of plants have not effect on all of microorganisms. The results showed that isoquinolin alkaloids of plants examined from *Papaveraceae* family and antimicrobial effect And so watery, ethanolic and ethanol-watery extracts are very important due to their high total content of phenolic compounds, and thus the appropriate antioxidant activity.

Among them, watery extract exhibited the highest total content of phenolic compounds and resulted antioxidant activity.

RESPONSE OF DRAGONHEAD (*DRACOCEPHALUM MOLDAVICA* L.) TO SOME AGRONOMICAL FACTORS

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Dragonhead is a hardy annual plant with aromatic, balm- scented, green foliage, and belongs to family Lamiaceae. In order to evaluate the effect of some agronomical factors on the essential oil content, shoot dry weight and some morphological characteristics of dragonhead (*Dracocephalum moldavica* L.) a field experiment was conducted in Sari Agricultural Sciences and Natural Resources university by using of split- split plot design in the base of randomized complete blocks with three replications in 2010. Three sowing dates (13 June, 6 and 18 July) occupied the main plots, three plant density (10*30, 20*30 and 30*30 cm) occupied the sub-plots and two levels of biofertilizer (Humifortebiofertilizer and non biofertilizer) applied to the sub-sub plots. The plants were investigated in full flowering stage; and essential oils were obtained from the aerial parts of the plant by hydrodistillation. The results showed that sowing dates has significant effect on plant height, number of nod, root width and essential oil content of Dragonhead. mean comparison showed that first and second sowing date had highest plant height (51.83 and 50.23 cm), the second and third sowing date had highest root width (149.8 and 148 mm) and the first sowing date had highest number of nod (8.95). Delay in sowing date increased essential oil content, significantly. The essential oil content (0.32) at Third sowing date was the highest. Except for plant height, there was no significant effect among herb yield, essential oil content and morphological characters of different plant densities. The result of mean comparison showed that first density had highest plant height (51.80 cm). The results showed that Humifortebiofertilizer has significant effect on root diameter, root width, root dry weight and essential oil content of Dragonhead. mean comparison showed that the highest root diameter (5.58 mm) and root width (140.55 mm) was obtained with the Humiforte biofertilizer. But the highest root dry weight (2.89 gr/plant) and essential oil content (0.21) were achieved under non biofertilizer. Humifortebiofertilizer had no significant effect on the all morphological characters and shoot dry weight. The results of this study showed that Third sowing date and higher densities (10 and 20 cm) with non Humiforte biofertilizer for achieved the highest essential oil content of dragonhead in Sari climatic condition was suitable.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF *RUTA GRAVEOLENS* HYDRO-ALCOHOLIC EXTRACT ON PENTYLENETETRAZOLE-INDUCED SEIZURE IN ADULT MALE MICE

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Seizure is an important symptom of epilepsy and many neurogenic disorders. Despite a variety of current anti-convulsive drugs, research for discovering new drugs with more efficacy and unsuitable adverse effects has been continued. Herbal medicine has various natural substances and proper context for this type of research. This study was surveyed the anticonvulsant effects of hydro-alcoholic extract of rue (*Ruta graveolens*) in adult male mice.

Anticonvulsant effect of extract evaluated by PTZ induced seizure in this study. Case groups have been injected by 100, 300, 500, 800, 1000 mg/kg of extracts and control group 10 mg/kg normal saline intra-peritoneal. All groups were injected by **pentilen- tetrazole** (80mg/kg) intra-peritoneal, after 45minutes and initiation time of myoclonic and tonic-clonic seizures and percent of 24hours death were measured.

Consequences of different doses of rue hydro-alcoholic extract increased delay in initiation of myoclonic and tonic-clonic seizures rather than control group dose-dependently and reduced 24hours seizure-induced mortality (P<0.05). Dose of 1000mg/kg has had the best effect in prevention of 24hours mortality and the most delay in start of myoclonic and tonic-clonic seizure.

Regarding to collected results, it seems that extract of this herb has decremental effect on PTZ-induced seizure in male adult mice [1,2].

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EVALUATION EFFECT OF MEDICENAL PLANT EXTRACTS AGAINST POMEGRANT APHID, *APHIS PUNICAE*

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Because of good geographical conditions, a wide variety of medicinal plants are grown in Iran. In the recent years, research on medicinal plants has attracted a lot of attentions globally. Medicinal plants are part and parcel of human society to combat diseases and pests, from the dawn of civilization [1]. Historically, plants and plant derived materials played an important role in the management of pests. Plants produce different types of secondary metabolites that are believed to be a corner stone in plant natural defense [2]. In this study, botanicals extracted from *Ferula gumosa*, *Datura stramonium*, *Rubia tinctorum* and *Lawsonia inermis* were tested for their insecticidal activity against *Aphis punicae*. The plant extracts were sprayed by Potter Spray Tower at five concentrations, which 40, 47, 56, 67 and 80 µl/ml, under laboratory condition (26±2°C, 60-70% RH and a photoperiod of 16L: 8D h) on the 1st instar nymphs of *Aphis punicae*. There was a significant difference among the treatments of plant extracts and their concentrations. In determination of toxicity the LC₅₀ value for *Ferula gumosa*, *Datura stramonium*, *Rubia tinctorum* and *Lawsonia inermis* were calculated 80.04, 68.36, 50.60 and 40.99 µl/ml, respectively. The results showed that all extracts in 80 µl/ml had the greatest mortality effect. Since natural substances have been prove to have less side effects and less unwanted reactions with the environment, using natural materials for prevention of pests is more desirable. Eventually, it could be concluded from this investigation that extracts of these medicinal plant extracts can be usage for developing natural products to synthetic biopesticides against *A. punicae*.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF PLANTING DATE AND PLANT DENSITY ON YIELD AND SEED YIELD COMPONENTS OF DILL (*ANETHUM GRAVEOLENS L.*)

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Dill (*Anethum graveolens L.*) is an annual and sometimes biennial herb of the family Apiaceae, which is native to south-west Asia or south-east Europe, and has been cultivated since ancient times. It is used as a vegetable, a carminative, an aromatic and an antispasmodic, and as an inhibitor of sprouting in stored potatoes. In order to study the effect of sowing date and plant density on yield and yield components of dill (*Anethum graveolens L.*) a factorial arrangement of a randomized complete block design with three replications in Kerman (Iran) was conducted. First factor was planting date in three levels (29 February 15 and 31 March) and second factor was plant density in three levels (57, 102 and 147 plants m²). Each 1m² was divided to 3 planting lines. Row spacing was fixed (25 cm). In order to obtain the first (57 plant m²), the second (102 plant m²) and third (147 plant m²) densities, spaces on the rows were 5, 2.8 and 2 cm respectively. The measured traits included seed yield, biological yield, harvest index, number of umbel per plant, number of umbelet per plant and number of seed per umbel. The results showed that effect of planting date, plant density and their interaction on all of measured traits except harvest index were significant. Delaying in planting date lead to significant decreasing in seed yield, biological yield, number umbel per plant, number umbelet per plant and number seed per umbel. As increased density, increased seed yield and biological yield but decreased number umbel per plant, number umbelet per plant and number seed per umbel. Highest seed yield obtained from the first planting date and third density (147 plant m²).

EFFECTS OF ANTIMICROBIAL COMPONENTS OF ESSENTIAL OILS ON GROWTH OF *BACILLUS CEREUS*

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In spite of modern improvements in slaughter hygiene and food production techniques, food safety is an increasingly important public health issue. There is therefore still a need for new methods of reducing or eliminating food borne pathogens, possibly in combination with existing methods. One such possibility is the use of essential oils as antibacterial additives. An example of a natural antimicrobial compound is Carvacrol, which is present in the essential oil fractions of oreganum (60 to 70% Carvacrol) and thyme (45% Carvacrol). *Bacillus cereus* is a spore-forming pathogen often associated with two kinds of food-borne illnesses, a diarrheal and an emetic syndrome, caused by two distinct toxins. This microorganism is widely distributed in the natural environment and it is easily spread to many types of foods, especially those of plant and poultry meat origin. Determination of the membrane fluidity showed cells who exposure to Carvacrol have a lower membrane fluidity than nonadapted cells. This could be some kind of defence mechanism exhibited by the cell. An increase of the membrane fluidity increases the passive permeability of the membrane. Carvacrol acts as a transmembrane carrier of monovalent cations by exchanging its hydroxyl proton for another ion such as a potassium ion. K⁺ is the major cytoplasmic cation of growing bacterial cells, involved in several key functions of bacterial cells. This ion plays a role in the activation of cytoplasmic enzymes, the maintenance of turgor pressure, and possibly the regulation of the cytoplasmic pH. Carvacrol makes the cell membrane permeable for K⁺ and H⁺ and, consequently, inhibits ATP synthesis by dissipating the proton motive force. Based on this, it seems that, during exposure to Carvacrol, the driving force for optimal secretion of the toxin (ATP or the proton motive force) is not sufficient, resulting in accumulation of the toxin inside the cell. Consequently, intracellular toxin might inhibit its own synthesis (feedback inhibition).



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



**STUDY OF SOME ECOLOGICAL CHARACTERISTICS OF MEDICINAL PLANT
(*HYPERICUM PERFORATUM L.*) IN GOLESTAN PROVINCE
(CASE STUDY: TANGRAH THE GOLESTAN NATIONAL PARK)**

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Several of the secondary metabolites found in *Hypericum* species are today used as medication for the most differential disease patterns. *Hypericum perforatum* is a medicinal plant employed in the treatment of neurological disorders and has recently been shown to have anticancer potential [1]. This investigation was carried out to understand some ecological characteristics of *hypericum perforatum* and using them in abundant cultivation and applying in medicinal industries and prevent the natural habitats from destroying in golestan national park in 2011. After preliminary studies with rats navigation, Climatic, geologic and geomorphologic characteristics, land types, companion plants, habitat types, distribution map, phonologic study, vegetative parameters measurement and soil analysis were done in its habitat. This species was located in the southeastern slope of tangrah forests in Golestan national park at 350-1250m altitude. The climatic condition of the region is moderate and wet. Annual average precipitation is 950 millimeters and annual average temperature is 16.4 centigrade. This plant grows in silt-loam soil with pH=7.4–7.6 and Ec=0.39–0.88 milimouse/cm. Type of habitate was the destruction of forests. Some species wicth observed in distribution region of this plant were: *Melilotus officinalis*, *Sorghum halepensis*, *Rubus persicus*, *Origanum vulgare*, *Glycyrrhiza glabra*, *Eryngium bungei*, *Teucrium polium*, *Prunus spinos*, *Sanguisorba minor*, *Crataegus persica*.

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**COPARATIVE STUDY OF GARLIC TABLET AND EXTRACTION BLUBERRY SENSATION ON
CRYPTOSPORIDIUM PARVUM PARASITE IN HANKS SOLUTION**

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Cryptosporidium is a common factors of diarrhea in both humans and animals, it has globally widespread agent that causes severe and chronic diseases in HIV positive people and neonates. No effective cure has so far been reported. Our goal in this study was to explore the pharmaceutical effects of blue berry/cherry, garlic and mix of them on the *Cryptosporidium Parvum* Oocysts in HANK medium/environment. Material and Different concentration of extract blue berry/cherry and garlic tablets and mixture of them, including %100, %50, %25 and %12.5, were sterilized by filter 0.22. The Oocysts were separated from the stool of young calves suffering from diarrhea and using with Sucrose and Shyter methods. 100 λ amount of the parasite (2×10^6) and 900 λ of the extracts with different concentrations were poured into the Ependrof vials (pipes) and transferred to 37°C incubator for 24 to 48 hours (tests were performed as triplicates). The results showed that all concentrations were effective on *Cryptosporidium Parvum* Oocysts, but at 1/100 garlic concentration, showed the more effect compared with blue berry/cherry at the same concentration ($P < 0.0001$). The mix of them had the highest effect on the reduction of the *Cryptosporidium Parvum* Oocysts compared with single extract of blue berry/cherry and garlic tablets. As a result, this research shows that blue berry/cherry, garlic and mixture of them are effective on Cryptosporidium Oocysts, because of the existance a material called poly phenelic in blue berry/cherry and Allicine in garlic. Since chemical compounds have side effects, and that blue berry/cherry, garlic and mixture of them are effective on this parasite even in very low doses, therefore, they can be used in children, elderly and those with immune system defects.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF PRIMING WITH ASCORBIC ACID ON DROUGHT TOLERANCE, ANTIOXIDANT ENZYMES ACTIVITY, GIBBERELLIN AND PROLINE CONTENT OF SAFFLOWER UNDER DROUGHT STRESS

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The role of Ascorbic acid as a key molecule antioxidant involves in biotic and abiotic stress has already been well describe. In order to study effects of drought stress and priming with ascorbic acid on antioxidant enzymes activity, Gibberellin (GA₃) and Proline content of safflower an experiment was conducted. The experimental design was two factors factorial arranged in a completely randomized design (CRD), with three replications. The first factor was drought stress (0, -4, -6, -8, -12 bar) that was carried out by PEG 6000 and the second factor was Ascorbic acid (0, 55, 110, 165 Mm). Seeds of safflower were primed with Ascorbic acid solution for 16 h at 25⁰ C. After priming three replications of 25 seeds were germinated between two rolled sheets of filter paper with 5ml of respective PEG test solutions. Result indicated that Proline content, CAT and POX activity increased with enhancement of drought stress whereas that of Gibberellin (GA₃) content decreased significantly. Application of ascorbic acid indicated that later in involve in reduction of antioxidant enzymes activity, Proline content and increased Gibberelin content. Our data provide strong to the hypothesis that priming with Ascorbic acid reduced the harmful effects of drought and increased resistance to drought stress in safflower [1, 2].

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EFFECT OF PRIMING WITH PYRIDOXINE ON DROUGHT STRESS TOLERANCE DURING GERMINATION AND SEEDLING GROWTH IN SAFFLOWER

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Drought stress is one of the main causes of crop yield reduction in the majority of agriculture regions of the world .The objective of this study were to evaluate effects of priming with Pyridoxine on improvement of the germination characteristics and seedling growth of safflower under simulated drought stress. In order to an experimental factorial was conducted based on randomized complete design (CRD) with three replications. The first factor was drought stress (0, -4, -6, -8, -12 bar) that was carried out by PEG 6000 and the second factor was Pyridoxine (0, 0/01%, 0/02%, 0/03%). Seeds of goldasht were moistened in Pyridoxine for 16h at 25 C. Result indicated that with increase in drought stress, germination components such as germination percentage, seedling fresh weight, seedling dry weight, shoot length and root length decreased significantly. The interaction between Pyridoxine and drought stress on this parameters were significant. However it is concluded the priming result improvement in germination components and seedling growth of safflower in drought stress condition and increases the resistance of safflower to drought stress in germination phase [1, 2].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF SAFFRON (*CROCUS SATIVUS*) ON THE DENTAL PAIN CONTROL AFTER THE
ROOT CANAL TREATMENT

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Pain is the toughest human experience and herbal medicines have been used to reduce the pain from long time ago. Saffron, is a plant food flavor which had been established to have many health benefits. Saffron has been used to reduce pain and believes to reduce the tooth pain. Therefore in this study the effect of saffron on the dental pain control after the root canal treatment was clinically examined.

This study was a clinical trial on 36 patients that referred to the endodontics department of Zahedan Dentistry Faculty in 2011. Patients were randomized in one of A or B groups. After signing the consent, one of groups received 9 capsules consist of 100 mg Saffron and the other group received 9 capsules consist of 100 mg placebo every 6 hours for 48 hours. For measuring dental pain, VAS table was used. Tables after decoding were analysed With SPSS 16 and statistical test independent T-Test and Wilcoxon. The patients age average in placebo group was 35.12 ± 10.66 and in the test group was 32.68 ± 9.85 . The pain averages between men and women before treatment and after treatment was not significant in two groups. Also there was no significant difference in average pain before treatment in two groups. However there was a significant difference ($P < 0.01$) in pain average between two groups in 6, 12, 18, 24, 30, 36, 42 and 48 hours after treatment. This study suggests that Saffron could be use as an analgesic to reduce the dental pain after dental root canal treatment [1-6].

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EVALUATION OF PROMISING (ADVANCED) BREAD WHEAT GENOTYPES TO DROUGHT
STRESS BY USING DROUGHT TOLERANCE AND SUSCEPTIBILITY INDICES

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In this study 16 cultivars and advanced lines of wheat were studied under four different conditions of normal irrigation (without stress), early season stress, late season stress and complete stress (dry farming)/ four complete randomized blocks designs with three replication were used for independent experiments for one rural year in the farms of agricultural research center of Moghan. Different agronomic and physiologic traits were measured during growth season and then tolerance indicators were calculated analyzed. Simple and combined variance analysis of the studied traits showed that there are significant differences between genotypes for most of the characters, also in combined variance analysis interaction effects of stress condition and genotypes is significant for most of the traits/ And this indicates different reaction of genotypes in different conditions of drought stress/ Simple variance analysis of tolerance indicator in different traits in three conditions of stress showed that genotypes show different changes relative to normal condition/ Based on this fact drought stress indices TOL, GMP, MP, SSI, STI were calculated and the genotypes were divided in to four groups of A, B, C and D according to the STI/ Based on this clustering Chamran cultivar and the line N-81-16 are recommendable as the most suitable cultivar and line for cultivating in normal condition and different drought stresses (early season stress, late season stress and complete drought stress) and kohdasht cultivar and line N-79- 10 and N- 79-7 into condition of early season and whole season stress were clustered in group C and are recommendable for this condition.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



TO STUDY COMPARISON OF SIX DIFFERENT EXTRACTION METHOD OF DNA FROM SEVEN VARIETIES OF PLANT MEDICINE

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Human beings from old Ancient were using Natural Plant medicine for his body pain. History Showing from two thousand your ago of the Christian also was using the different Natural plant medicine. In the Present time, officially between Plant species 600 plant species are as Natural plant medicine. Among 600 Plant Species , 60 Plant Species having Economic value and good Product for the Market, and only few species using for Agriculture purposes . Aim of Present Study the best method of determination for Extraction of DNA in 6 Natural plant medicines. Experiment was conducted as complete randomly factional block design in Molecular Biology Laboratory, Department of Agriculture, Zabol University, in 2008. Factor A in clouding eight (8) varieties of plant medicine (*Salvia-Cassia obovata* L- *Cassia angustifoliavah* L- *Hibiscus sabdariffa* L- *Citrullus colocynthis* - *Plantago major* L- *Ocimum*) Factor B in clouding Six Method of Extraction of DNA (Dellaporta -Grades and Brandes - Zolen and Pavkila – CTAB -Doyle and Doyle - Miniprep) In the Present study result has been Shown *Cassia obovata* L and *Cassia angustifoliavah* L Miniprep # CTAB and Doyle and Doyle- *Ocimum* method Grades and Brandes # Miniprep and Doyle and Doyle plant *Hibiscus sabdariffa* L , Miniprep and Doyle and Doyle- *Plantago major* L, *Dellaporta- Amaranthus retroflexus* , Zolen and Pavkila and plant *Citrullus colocynthis* method Miniprep _ Doyle and Doyle having the best band and it is very clear old for determination of concentration used biophotometry Instrument and *Ocimum* having ware compatibility with Extraction method of DNA.

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CHEMOPROTECTIVE EFFECTS OF *OREGANUM VULGARE* AGAINST GENOTOXICITY INDUCED BY CYCLOPHOSPHAMIDE IN MICE BONE MARROW CELLS

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Cyclophosphamide (CP), an anticancer alkylating agent, and its metabolites can bind DNA, causing damage that may result in chromosome breaks, micronucleus formation and cell death [1]. The protective effect of *Oreganum vulgare* extract was investigated in mouse bone marrow cells against genotoxicity induced by CP. Mice were orally (gavaged) pretreated with solutions of *oreganum* extract prepared at 4 different doses (50, 100, 200 and 400 mg/kg body weight) for 7 consecutive days. They were injected with CP (50 mg/kg body weight) on the seventh day of treatment and killed after 24 hours for the evaluation of micronucleated polychromatic erythrocytes (MnPCEs) and the ratio of PCE/ (PCE + NCE), where PCE refers to polychromatic erythrocyte, and NCE refers to normochromatic erythrocyte. Three last doses of extract significantly reduced MnPCEs induced by CP (P <0.0001). *Oreganum* extract at a dose of 200 mg/kg body weight completely normalized the PCE/ (PCE + NCE) ratio. Administration of *oreganum* inhibited bone marrow suppression induced by CP. *Oreganum* extract exhibited concentration-dependent antioxidant activity on 1,1-diphenyl 2-picryl hydrazyl free radical. It appeared that *oreganum* with antioxidative activity reduced the oxidative stress and genotoxicity induced by CP in mouse bone marrow cells.

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EFFECTS OF VARIOUS TEMPERATURES AND PH VALUES ON THE ANTIOXIDANT
ACTIVITIES OF SOME PEPPER (*CAPSICUM ANNUUM L.*) VARIETIES PHENOLIC EXTRACTS

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Peppers contain moderate to high levels of neutral phenolics or flavonoids, phytochemicals that are important antioxidant components of a plant-based diet, other than traditional nutrients, that may reduce the risk of degenerative diseases [1]. Antioxidant activities in 2 different colored (red and green) sweet bell peppers (*Capsicum annuum L.*) were investigated. The red peppers were selected from those in Shahreza of Esfahan and the green peppers with the local name of Gijlar were selected from those in Urmia of West Azarbaijan. The experiments were carried out to evaluate the effects of various temperatures (20, 35, 50 and 65 °C) and pH values (1.5, 3, 4.5 and 5.2) on the total phenolic content [2], flavonoid content [3], reducing power [4], chain-breaking activity [5], scavenging activities of 2, 2-diphenyl-1-picrylhydrazyl (DPPH) [6], nitrite [7] and hydrogen peroxide [8] radicals. The results indicated that scavenging activities of DPPH radicals not significantly different in various temperatures but it decreased at pH 1.5 in red pepper and increased at pH 3 and 4.5 in green pepper and this ability in red peppers were higher than green peppers. Scavenging activities of nitrite radical relatively decreased from 20 to 65 °C and exhibited high activity at pH 5.2 but there was no significant difference in other 3 pH values and this ability in red peppers were higher than green peppers. Scavenging activities of hydrogen peroxide radicals not significantly different in various temperatures and pH values and this ability in green peppers were higher than red peppers.

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EFFECT OF HUMIC ACID AND NITROXIN ON GROWTH AND ESSENTIAL OIL OF *ARTEMISIA VULGARIS L.*

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Fertilizer management is one of the most important factors in successful cultivation of medicinal plants. Fertilizers can affect the quality and quantity of plant indexes. Fertilizers have played an important role in plant growth and development. The excessive use of chemical fertilizers has generated several environmental problems. Some of these problems can be tackled by use of biofertilizers which are natural, beneficial and ecologically friendly. In addition to fixing atmospheric N, the bacteria of bio-fertilizer of nitroxin helped to the growth and development of roots and shoots of plants [1]. The experiment was carried out to study the effect of different biofertilizers on agronomic and quality criteria of Mugwort (*Artemisia vulgaris L.*). A medicinal and aromatic plant from Compositae family at Research Station of Faculty of Agriculture, Ferdowsi University of Mashhad, during years of 2011. It was based on a Randomized Complete Block Design with three replications. The fertilizer treatments included control (without fertigation) acid humic on three levels (1, 2 and 3 mgL⁻¹) and nitroxin on three levels (0.5, 1, 1.5 mgL⁻¹). The result showed that biofertilizers had significant effect on growth, yield Components and essential oil content compared to control. Humic acid at (3 mgL⁻¹) recorded highest vegetative growth and essential oil content compared to other treatments. In total, the results indicated that supplying enough biofertilizers for plants plays an important role in enhancing vegetative growth, yield components.

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Kish Island



INFLUENCE OF GROWTH REGULATORS AND METHOD OF CULTURE ON GROWTH AND YIELD OF MEDICINAL PUMPKIN (*CUCURBITA PEOP* VAR *STYRIACA*)

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Growth regulators (GA3 and NAA) play an important role in both morphology and physiology of the plants. The effect of growth regulators varies with plant species, variety, their concentration used, and method of application, frequency of application and other factors which influence the absorption and translocation of chemicals [1].

A field experiment was conducted at Agricultural Research Station, in Ferdowsi University of Mashhad, during spring and summer 2011, to study the effect of plant growth regulators and method of culture on growth and yield on medicinal pumpkin (*Cucurbita pepo* var *styriaca*). Treatments were seed priming (control (water), IBA (100 ppm), GA3 (25 ppm) and Ethephon (200 ppm)), and growth regulators spraying (control (water), IBA (100 ppm), GA3 (25 ppm) and Ethephon (200 ppm)) and two method of culture farming method and trellis method). The plant growth regulators were applied on 4 true leaf stages for tree time. The experimental design was split-plot with four replications. The results of the investigation indicated that the growth and flowering characteristics: vine length, %DM leaf, stem and root, leaf area, number of male and female flowers per plant, number of node to first male and female flower increased significantly due to application of plant growth regulators. The seed and oil yield were significantly influenced by growth regulators and highest seed and oil yield was obtained in (combined of priming with control (water) and spray with GA3) treat, compared to other treatments. Among the treatments combined of priming with IBA and spray with GA3 recorded significantly higher oil percent in seeds. However control recorded lowest fruit yield. The maximum fruit yield was mainly attributed to its close association with morphological characters viz., vine length, number of female flowers per plant, number of leaves, leaf area and yield components viz., number of fruits per plant, percent fruit set thus it is inferred that application combined of priming with control (water) and spray with GA3, was most effective in increasing the fruit yield in medicinal pumpkin.

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ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF ECHINACEA (*ECHINACEA PURPUREA* L.) AFTER MICROWAVE IRRADIATION

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Echinacea purpurea is the most common pharmaceutical herbs among the various Echinacea species [1]. Echinacea belonging to the family Asteraceae. Its origin is South America and grows greatly in the northern part of Missouri River. *Echinacea purpurea* L. contains valuable substances which used in producing medicine for influenza and also they increase production of immunoglobulin G [2]. Alkylamides, polysaccharides, glycoproteins and chicoric acid are effective compounds of *Echinacea purpurea*. Chicoric acid is the main phenolic compound with antioxidant activity. Alkamide does not have antioxidant activity on its own, but increases the antioxidant activity of chicoric acid [1]. Spices and herbs are contaminated by microorganisms; which can be occurred during the process, storage and transportation. Microwave irradiation is being used widely in order to eliminate the microbial contaminations [3]. The present study examines the effect of microwave irradiation on antioxidant and antimicrobial activities occurring in *Echinacea purpurea* L. In this study, Echinacea at power of 100, 180 and 300 W for 5 min was irradiated by microwaves and in order to undergo the sequence experiments, the hydroalcoholic extracts (EtOH 50%) were prepared. The antioxidant activity of irradiated and control samples was evaluated by DPPH radical scavenging, ferric reducing power, beta caroten bleaching and phenolic content of samples. In order to study the antimicrobial activity, for determination of minimal inhibitory concentration (MIC) on *E. coli* and *S. aureus*, broth diluting method was used. All tests were performed in triplicate and differences among the means were determined using least significant differences (LSD) test at $\alpha = 0.01$. Results showed that microwave treatment at 100, 180 W had no significant effect on antioxidant parameters, phenolic content and antimicrobial activities of samples. Whereas, at 300 W an increase in phenolic content, antioxidant and antimicrobial activity of extract was observed. Finally, The results indicated microwave irradiation do not have any negative effect on antioxidant and antimicrobial activities of Echinacea. In addition, using an appropriate microwave treatment could be an effective process to cleaved phenolic compounds. Therefore, resulting in the increase of antioxidant and antimicrobial activity of the extract.

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16, 17 May 2012
Kish Island



EFFECTS OF GAMMA IRRADIATION ON ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF HYSSOPUS (*HYSSOPUS OFFICINALIS* L.)

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Hyssopus officinalis L. is one of the most important pharmaceutical herbs belonging to the Labiatae family. This plant is extensively cultivated in south and central parts of Europe and also in Iran. *Hyssopus* oil has antibacterial and antifungal activities. In spite of having a bitter taste it's used in food industry as a flavoring agent and also in sauce formulations [1]. Medicinal herbs like other agricultural products are exposed to wide range of microbial contamination, during processing, transportation and storage, which can result in quality loss. Gamma irradiation processing is an important among the most recent non thermal methods to decontamination of food products. Also, this is the safe known method to eliminate contamination of herbs and spices [2]. Today, there is a growing scientific interest on influence of irradiation process on biological activity and compounds responsible for such activities. Therefore, the present study examines the effect of gamma irradiation on antioxidant and antimicrobial activities occurring in *Hyssopus officinalis* L. In this study, samples were exposed to gamma irradiation of 10, 15, 20 and 25 kGy. In order to undergo the sequence experiments, the hydroalcoholic extracts (EtOH 50%) were prepared. The antioxidant activity of irradiated and control samples was evaluated by DPPH radical scavenging, ferric reducing power, beta caroten bleaching and phenolic content of samples. In order to study the antimicrobial activity, for determination of minimal inhibitory concentration (MIC) on *E. coli* and *S. aureus*, broth diluting method was used. All tests were performed in triplicate and differences among the means were determined using least significant differences (LSD) test at $\alpha = 0.01$. Results showed that gamma irradiation had no significant effect on antioxidant parameters and phenolic content of samples. Also, the results regarding the effect of gamma irradiation on antimicrobial activities showed that there was no significant difference in the activity of irradiated extracts up to dose of 25 kGy. Finally, the results indicates that irradiation treatment of *hyssopus* do not have any negative effect on antioxidant and antimicrobial activities and irradiation up to 25 kGy retains antioxidant and antimicrobial activities of its extracts. Based on these results, we can suggest that gamma irradiation treatment up to 25 kGy is safe for *hyssopus* and also preserve the quality from the standpoint of functional properties.

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THE EFFECT OF TEMPERATURE, LIGHT AND PH ON STABILITY OF ANTHOCYANIN PIGMENT IN RED-FLESHED APPLE.

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The Anthocyanin pigments are most abundant flavonoid constituent of fruits and vegetables. This pigment was extracted from Red-fleshed Apple by using the soaking in ethanol (1% acidified). The extracted Anthocyanin Pigment were Placed in Various environmental conditions which could destabilize the anthocyanin molecules. These environmental conditions were included three different pHs (0, 1.5, 3), various temperature (5, 15, 25, 35), and presence or absence of light.

The result of the study showed that increasing in pHs, temperatures and presence of light cause to increase of molecules anthocyanin that produce the extreme red color of these apples genotypes.

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PHYTOCHEMICAL AND ANTIOXIDANT ACTIVITY IN DIFFERENT PARTS OF *HERACLEUM GORGANICUM* RECH. F. IN NORTH OF IRAN

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Heracleum gorganicum Rech. F. (Apiaceae) with locally known as "Golpar", is one of the most important Mountainous medicinal plant in North of Iran, which has been used by the rural healers as flavouring agent, spice and also to treatment of antiseptic, epilepsy and digestive [1,2]. In this research due to study of the relationship between the most important secondary metabolites content (phenol, flavonoid) and their antioxidant activity in *H. gorganicum*, different parts of *Heracleum gorganicum* were collected of Ziarat Mountainous region in different growth period of plant (March-September, 2011), then dried and were extracted by methanol solvent. Total phenolics (TP) and total flavonoids (TF) content were determined spectrophotometrically and their antioxidant activity were measured by three methods: 1,1-diphenyl-2-picryl hydrazyl radical scavenging (DPPH), Total Antioxidant Capacity (TAC) and Reducing Power (RP) methods. The findings of phytochemical indicated that the TP contents had range 1.31 ± 0.22 to 14.6 ± 0.52 mgGAE g⁻¹ and TF contents were between 2 ± 0.5 to 84.84 ± 11.65 mgQUE g⁻¹. Antioxidant Activity (IC₅₀) was measured in ranges 0.11 ± 0.01 to 0.23 ± 0.015 mg/ml for DPPH, 0.3 ± 0.08 to 2.03 ± 0.007 mg/ml in TAC, and 0.26 ± 0.09 to 3.64 ± 0.136 mg/ml in RP methods. Therefore analyses of these results showed that there was a positive correlation between antioxidant activity and secondary metabolites content, and the leaves of *H. gorganicum* with the highest content of TP and TF compounds and antioxidant activity were the most important part which could provide natural sources of antioxidant compounds to treatment of disorders associated with free radicals for future research. Therefore we offer to research about investigation effect of various solvent in release of secondary metabolites in different parts of *H. gorganicum* and survey of their effects in *in vivo* and clinical models.

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ETHNOPHARMACOLOGY AND ANTIBACTERIAL ACTIVITY IN DIFFERENT PARTS OF *HERACLEUM GORGANICUM* RECH. F. IN NORTH OF IRAN

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Golestan province with ecological variation has the best potential for growth of wild medicinal plants. *Heracleum gorganicum* Rech. F. belongs to Apiaceae family, with locally known as "Golpar", is one of the most important medicinal plants in North of Iran, which has been used by the rural peoples as flavouring agent, spice and also to treatment of antiseptic, epilepsy and digestive [1,2]. In this research due to ethnopharmacology study, famous rural healers (60-70 years old) were identified in Ziarat Mountainous village in Golestan province and traditional information in many field such as ecological equipments, part used and its effects were obtained, also due to survey of antibacterial activity of *H. gorganicum*, the root, leave and fruit of plant were collected, dried and extracted by methanol. Antibacterial properties were obtained by "Disc diffusion", and "Well diffusion" methods against 9 Gram positive and negative bacteria. Ethnopharmacology results showed that different parts of *H. gorganicum*, especially fruits has been used in traditional medicine of this region as flavouring agent and spice for food, making pickles and to treatment of carminative, antiseptic, digestive, epilepsy and analgesic. Antibacterial screening of this research indicated that maximum antibacterial activity was observed in leaves extract, in which *Staphylococcus aureus* with inhibition zone 28 and 18mm in well diffusion and Disc diffusion methods respectively and MIC 11.12 mg/ml was the most sensitive strain of bacteria test, whereas *Salmonella typhimurium* with none inhibition zone and MIC 174.8 mg/ml was found to be the most resistant bacteria strain among of Gram positive and negative bacteria. Therefore we offer to research about investigation effect of another solvent in antibacterial activity in different parts of *H. gorganicum* and survey of their effects in *in vivo* and clinical models.

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IDENTIFICATION OF VOLATILE ORGANIC COMPOUNDS IN SEEDS OF *ARTEMISIA FRAGRANS*

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Artemisia L. (Asteraceae) is a large genus of bitter aromatic herbs or shrubs encompassing more than 350 species. Many *Artemisia* species are known as remedy for a wide range of diseases including malaria, cancer, hepatitis, inflammation, and infections by bacteria, fungi, and viruses. This genus is also famed for its aromatic compounds, which are mainly bioactive terpenoid and phenolic components [1]. Therefore, the interest in chemical constituents of the aerial parts of the plant has increased during last decades [2, 3]. However, only a few phytochemical investigations have so far been carried out on volatiles of the seeds. In the present study, we aimed to investigate the composition of volatile organic compounds (VOCs) in seeds of *Artemisia fragrans* Willd., a perennial herb growing wide in north-west of Iran [4,5]. For this propose, seeds of three populations of *A. fragrans* from Azerbaijan province of Iran have been collected. A hydrodistillation (HD) sampling method coupled with gas chromatography-mass spectrometry (GC-MS) was used to monitoring the VOCs. Under the optimal conditions, a range of VOCs extracted from seeds of the different populations were identified and compared. Accordingly, considerable amounts of bioactive compounds such as Camphor, alpha-Terpiene, gamma-Terpinene, Carvacrol, 1,8-Cineol, Thujyl alcohol, Pinocarvone, Verbenol, Germacren D and Spathulenol were recognized. Intriguingly, the nature and level of the volatiles in studied populations were notably varied. This work is actually a major step, which opens new perspectives for further studies on the VOCs of *Artemisia* seeds.

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EVALUATION EFFECTS OF BIOLOGICAL FERTILIZERZ ON AGRONOMIC AND QUALITY CERTERIA ON LOCAL MASS AND REVISED VARIETIES OF *SESAMUM INDICUM*

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Application of biofertilizers, especially plant growth promoting rhizobacteria and *Pseudomonas* is one of the most important strategies for plant nutrition compared to chemical fertilizers, especially in sustainable management of agroecosystems [1]. In order to investigate the effect of biological fertilizers on the growth indices, yield and yield components of three sesame cultivars (*Sesamum indicum* L.) and evaluation effects of them on local mass and revised varieties (Kalat, Esfarayen and Oltan), an experiment conducted in the 2010-2011 in the form of split plots with randomized complete block design with three replications. Three cultivars of Sesam (Kalat, Esfarayen and oltan) allocated to the main plot and three biological fertilizers (nitroxin, phosphate solubizing bacteria, nitroxin + phosphate solubizing bacteria and control) allocated to sub plot. Parameters such as SPAD readings, leaf area index (LAI), Crop Growth Rate(CGR), Net Assimilate Rate (NAR), biological and economic yield, Oil content and yield, plant high, number of auxiliary branches, number of pods per plant, number of seeds per pod and 1000 seed weight were measured. Most of these parameters were not affected by the fertilizer treatments. However, there were significant differences between varieties. These results showed that biological fertilizers are effective on local mass, especially Esfarayen variety. Also nitroxin+biophosphor measured plant height observed with nitroxin application. In this experiment, sesame did not respond to biological fertilizers properly and this seems to be associated with the nature of this plant and the fertilizer soil conditions and the status of biological. Our results are consistent with other researcher's reports [2,3].

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INVESTIGATION ON DISTRIBUTION OF *EUPATORIUM CANNABINU* L. IN IRAN

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The genus *Eupatorium* L. belongs to *Eupatorieae* tribe and *Asteraceae* Family. It includes over 1000 species which distribute all over the world. According to Flora Iranica (Rechinger, K. H. 1989), this is a species of *Eupatorium cannabinum* in the different regions of Iran. *E. cannabinum* is a perennial plant with many medicinal applications. Leaves (harvested before blossoming) and roots (in spring and autumn) are used in traditional medicine because of supposed depurative, choleric, laxative, appetizing, stimulating and wound healing properties, also it use for liver diseases. It generally grows in variety sites such as marshes, dark wetter habitats, banks of river and streams. It distributes in north, north-western, center and north-eastern of Iran and also in Tالش, Europe, Turkey, Iraq, Turkmenistan Africa and America. This investigation aimed to provide the identification and distribution maps. The study was based on fresh material from field as well as herbarium specimens. All of herbarium specimens existed in TARI, IRAN and FUM belong to this taxon were revised based on morphological characters. Results showed distribution of *E. cannabinum* is in Mazandaran, Gilan, Azerbaijan, Khorasan, Tehran and Zanzan Provinces.

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DISTIBUTION OF *GUNDELIA TOURNEFORTII* L. AS A MEDICINAL PLANT IN IRAN

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The genus *Gundelia* L. belonging to *Arctotideae* tribe and *Asteraceae* Family, is an important food source and a well-known medicinal plant. Both the aerial parts and seeds of *G. tournefortii* have antioxidant potential. The flowers, leaves, seeds and stems of *G. tournefortii* are used as food sources. In the Middle East, the young and still undeveloped flower buds of *G. tournefortii* are sold in the local markets just like artichoke. Dry seeds of *G. tournefortii* are also known to be effective for the treatment of vitilligo disease. It is a monotype genus. According to Flora Iranica (Rechinger, K. H. 1989), it is a perennial species of *G. tournefortii* in the different regions of Iran. It generally grows in variety sites such as flat steppe area, foothills, rockyslopes and loose conglomerate. It distributes in north, north-western, West, center, north-eastern, east and south of Iran and also in Afghanistan, Central Asia, Syria, Europe, Turkey, Iraq, Caucasus, and Cyprus. This investigation aimed to provide the identification and distribution maps. The study was based on fresh material from field as well as herbarium specimens. All of herbarium specimens existed in TARI, IRAN and FUM belongs to this taxon were revised based on morphological characters. Results show distribution of *G. tournefortii* is in Mazandaran, Gilan, Azerbaijan, Kordestan, Kermanshah, Lorestan, Esfahan, Yazd, Kohkilouyeh va -Boirahmad, Fars, Bushehr, Kerman, Baluchestan, Khorasan, Markazi, Tehran and Zanzan Provinces.

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DISTRIBUTION OF *SIEGESBECKIA ORIENTALIS* L. AS A MEDICINAL PLANT IN IRAN

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Siegesbeckia L. is a genus belonging to the *Heliantheae* tribe of *Asteraceae* family. It is an important annual herbs and a well-known medicinal plant, widely distributed in tropical, subtropical, and temperate parts of the world. The aerial parts of *S. orientalis* have been used as a traditional Chinese medicine, to treat rheumatic arthritis, hypertension, malaria, and snakebite. Extracts and some chemical constituents of *Siegesbeckia* exhibit antioxidative, antiallergic and antifertility activities. According to Flora Iranica (Rechinger, K. H. 1989), it is an annual species of *S. orientalis* in the different regions of Iran. It generally grows well in particularly hot, damp climates. It distributes in north and center of Iran and also in, Europe, Turkey, Caucasus, and Pakistan. This investigation aimed to provide the identification and distribution maps. The study was based on fresh material from field as well as herbarium specimens. All of herbarium specimens existed in TARI, IRAN and FUM belong to this taxon were revised based on morphological characters. Results show distribution of *S. orientalis* is in Gorgan, Mazandaran, Gilan and Tehran.

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COMPOSITION, ANTIMICROBIAL AND ANTIOXIDANT ACTIVITIES OF *PULICARIA GNAPHALODES* (VENT.) BLOSS. ESSENTIAL OIL

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The genus *Pulicaria* (family Compositae) is represented in the flora of Iran by five species [1]. In previous studies, isolated of a new clerodane lactone, which is closely related to hardwickiic acid, has been reported from the aerial parts of *P. gnaphalodes* [2]. The essential oil of *P. gnaphalodes* from Tehran area was contained about 65% monoterpenes, with alpha-Pinene (34%) and 1,8-Cineole (12%) as main constituents, and about 30% sesquiterpenes, having a Cadinane or Bisabolane skeleton [3]. Also, some new Cadinene derivatives such as 1,8-Oxidocadin-4-ene, 1(10),4-cadinadien-8 α -ol, 4,10(14)-Cadinadien-8-o1 and 4,10(14)-Muurooladien-8-o1 were isolated [4]. The essential oil of the aerial parts of *P. gnaphalodes* from Qom region was analyzed by GC and GC-MS methods. Eighty-seven compounds, accounting for 84.2% of the total oil, were identified. The main components of the oil were Myrtenol (13.2%), Citronellol (9.0%), Shiromoll (5.1%), Geraniol (5.1%) and alpha-Pinene (5.0%). The oil was found to be rich in regards to oxygenated monoterpene (39.2%). The antimicrobial activity of oil was determined against two bacteria and one fungal strain. The oil was active against some of the microorganisms. The oil antioxidant activities were measured by DPPH assay and β -carotene-linoleic acid tests. The essential oil significantly reduced the concentration of DPPH free radical (36.0%), with an efficacy higher than that of trolox (33.0%). Also, a 73.0% inhibition was noted in formation of peroxidation products in β -carotene bleaching test. The activity of the oil may be due to the presence of phenolic and major compounds.

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EFFECT GROWTH REGULATORS ON MICROPROPAGATION OF *EUCALYPTUS CITRIODORA*

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Eucalyptus citriodora Lemon-scented Gum is a fast growing plant that's important industrial and high commercial values and for essential oil in perfumery industry widely cultivated. This study was carried out as micropropagation *E. citriodora* in MS culture medium through bud culture. Different treatments of sterilization, shoot multiplication and rooting, were carried out. Immersion samples in water for 2 hour and dipping in 20 % sodium hypochlorite solution in 18 min. was the best treatment for surface sterilization. This study was done in a factorial trail based on the randomized completely design. These shoot were cultured on a modified MS medium containing half strength nitrate and cytokinines BAP, Kin, GA₃ and auxins in 0.5, 0.2, 0.1, 0.01 mgL⁻¹ respectively by 200 mgL⁻¹ P.V.P. The best rooting treatments were immersion of shoot in auxine hormone containing NAA 8 mgL⁻¹ for 24 h and then transferred to a modified MS (1/2N) medium. These plantlets transferred to soil and kept were in the greenhouse conditions.

CHEMICAL COMPOSITION OF ESSENTIAL OIL AND ANTIBACTERIAL ACTIVITY EXTRACTS OF *PROSOPISFRACTA* FRUIT

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Medicinal plants contain active chemical constituents in any of their parts like root, stem, leaves, bark, fruit and seeds which produce a definite curing physiological response in the treatment of various ailments in human and other animals. *Prosopisfracta* (*Fabaceae*) is used in traditional medicine to treat bacterial infections. There is a need to evaluate extracts of this plant in order to provide scientific proof for its wide application in traditional medicine system.

Extraction of fruit of *P. fracta* using solvents of increasing polarity: methanol. The extracts were tested for antibacterial activity, and essential oil analyzed by (GC/MS) for determining their chemical composition and identification of their components.

The major component of essential oil is Decane (32.80%), Dodecane (10.34%), Cyclohexane (5.95%). Extracts of the fruit of *P. fracta* exhibited antibacterial activity against standard strains of gram positive and gram negative bacteria. Extracts exhibited the strongest activity against *Staphylococcus aureus*.

CHEMICAL COMPOSITION OF ESSENTIAL OIL AND *IN VITRO* ANTIBACTERIAL ACTIVITY OF THE ETHANOLIC EXTRACT FROM *ORCHISMASCULATA*

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Medicinal plants are primary source of health care throughout the world for thousands of years. In the middle of 20th century, researchers preferred to use synthetic medicines over natural medicines for curing various diseases. However due to emergence of various side effects of synthetic drugs, trend to use medicinal plants to cure various diseases is becoming popular. *Orchismasculata* is well known as medicinal plants because of their biological and pharmacological prop- retires. The antimicrobial activities of the essential oils on micro-organisms, including multiple antibiotic resistant bacteria, were evaluated using the disc diffusion method. The chemical composition of the essential oil was determined by Gas Chromatography (GC) and Gas chromatography-Mass Spectrometry (GC-MS). The extract of the *Orchismasculata* showed very effective bactericidal activity with the strongest inhibition zone: *Enterobactercloacea*, *Kelebsiella pneumonia* (Gram-negative) and *Staphylococcus aureus*, *Bacillus subtilis* (Gram-positive) bacteria, (12, 10, 16 and 11 mm) respectively and the major components were identified in the essential oils was Decane in the ratios of (34.99%), Dodecane (10.42%), Phytol (4.02%) too.



IDENTIFICATION OF FIVE DIFFERENT SPECIES OF LAMIACEAE FAMILY KNOWN AS THYME IN FARS PROVINCE

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The genus *Thymus* L. is one of genera of *Lamiaceae* family which is included in the sub-family of *Nepetoideae*. In Fars Province, like other regions of Iran, the different species of four genera including: *Ziziphora* L., *Zataria* Boiss., *Gonscharovia* (B. Fedtsch. & Gontsch.) Borissova and *Satureja* L. are wrongly used as *Thyme* for pharmaceutical, industrial and food purposes. Therefore, to exactly identify the species, their habitats in Fars Province were visited in different seasons of spring, late summer and autumn. Complete samples of plants (leaf, flower, seed and stem) from all habitats were collected, pressed and dried according to conventional method. These species were identified in the Herbarium of the Research Center for Agriculture and Natural Resources of Fars Province using valid botanical references. Also data including the altitude, slope and the types of plant communities for all habitats were recorded. This study showed that *Zataria multiflora* is near taxon to *Thymus* and known as Shirazian Thyme, has almost similar characteristics to *Thymus*. The genus *Ziziphora* with three annual species *Z. tenuior*, *Z. persica* and *Z. capitata* and a perennial species *Z. clinopodioides* has less similarity and relation with *Thymus*. Nevertheless, the perennial species has pharmaceutical use due to the similarity of its leaves to *Thymus*. One of the species of genus *Satureja* known as *S. bachtiarica* is very close to *Thymus* in terms of the morphology, aroma and is wrongly introduced as *Thymus* by local people. Also *Gonscharovia popovii* is wrongly introduced as *Thymus*.

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CYTOGENETIC STUDIES ON CERCIS L. AS A MEDICAL PLANT

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Cercis L. Belonging to the family *Caesalpinaceae*, is an important medicinal plant. It includes about 10 species distribute mediterranean region, Atlantic, N-America to Mexico and Asia. In flora Iranica it is represented by 2 species. It contains small deciduous trees or large shrubs commonly known as Redbuds. They are characterised by simple, suborbicular, cordate, petiolate leaves and pinkish-red flowersborne in the early spring on bare leafless shoots, on both branches and trunk. Six populations of two *cercis* species: *Cercis siliquastrum* (three populations) and *Cercis griffithii* (three populations) were selected based on their morphological characteristics to investigate their karyotypes. Preparation was made using fresh grown root tips. Saturated α -bromonaphtaline, formaldehyde and chromium trioxide (1:1), 1 N NaOH and hematoxiline were used for pre-treatment, fixation, hydrolyser and chromosome staining agent, respectively. The chromosomal studies were done using photomicroscope equipped with micrometer. Karyological data such as long arm, short arm and total length were recorded on all chromosomes of 5 well prepared cells at metaphase stage containing a complete set of chromosomes. Finally, pearson correlation coefficient was estimated for all paired combinations of the karyotypic characteristics to investigate their inter-relationships. The results confirm no differences were found among the different species for the number of chromosomal stocks ($x=7$). All species were diploid with $2n=2x=14$.

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INVESTIGATION OF ANTINOCICEPTIVE EFFECT OF WATER STRESS EXTRACT OF LEAVES
OF *ZIZIPHORA CLINOPODIODES.LAM* ON NMRI MALE MICE

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Ziziphora Clinopodiodes (ZC) is a plant belongs to labiatae family [1]. Recent research on this plant has shown its different therapeutic effect .The plant is used as, stomachic, antifever, antiinflammatory, sedative and flavoring agent in Iranian folk medicine [2].The aim of this study was to evaluate the anti-nociceptive effect of ZC extract on male mice. This study has been done on NMRI male mice of 20-25 g in weight. We used Formalin Test for demonstrating its anti- nociceptive effect. In this test, mice were divided into 5 groups (each group consisting of 8 mice): Sham, Positive Control, experimental groups. Experimental groups receiving extract at doses of 250,500 and 1000 mg/kg. Also, Positive Control receiving morphine at dose of 10 mg/kg in Formalin test. The results showed, that extract reduced nociception meaningfully in both acute and chronic phases. It is concluded that the water Stress extract of *Ziziphora.C* has antinociceptive effect, and this effect may be flavonoid and terpenoid [3,4] components in this plant, which have antinociceptive properties.

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CHEMICAL COMPOSITION OF THE ESSENTIAL OILS EXTRACTED FROM THE LEAF AND
FLOWERS OF *MARRUBIUM VULGARE* IN IRAN

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The genus *Marrubium* comprises 10 species, which are found wild in many regions of Iran. Among them, *Marrubium vulgare* L. is a perennial herb of the Labiatae family. It possesses tonic, aromatic, stimulant, expectorant, diaphoretic and diuretic properties. The plant is reported to possess hypoglycemic, anti-inflammatory and antioxidant activity [1-3]. The volatile constituents of the oil extracted from the leaves and flowers of *Marrubium vulgare* were isolated through a hydrodistillation method and then analyzed by GC and GC-MS. The leaf oil was found to contain 18 components and the flower oil contained 17. The major constituents of the leaf oil were Spathulenol, 58.9%, and Caryophyllene oxide 14.5%, and the main components of the flowers oil were Spathulenol, 41.6%, Caryophyllene oxide, 15.3%, and E- β -farnesene, 13.8%.

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CHEMICAL COMPOSITION OF THE ESSENTIAL OILS EXTRACTED FROM THE LEAF AND FLOWERS OF *STACHYS BYZANTHINA* C.KOH IN IRAN

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The genus *Stachys* consists 34 species present in Iran 13 of them are endemic. *Stachys byzanthina* used as an ulcer healer and anti septic too [1,2]. The volatile constituents of the oil extracted from the leaves and flowers of *Stachys byzanthina* were isolated through a hydrodistillation method and then analyzed by GC and GC-MS. The leaf oil was found to contain 17 components and the flower oil contained 21. The major constituents of the leaf oil were Germacrene D, 48.6%, and Epi- α -bisabolene, 17%, and the main components of the flower oil were Germacrene D, 46.7%, E-Caryophyllene, 12.2%.

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IN VITRO MICROPROPAGATION OF ALOE VERA – IMPACTS OF PLANT GROWTH REGULATORS, MEDIA AND TYPE OF EXPLANTS

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Aloe vera is an important medicinal perennial herb belonging to the family *liliaceae*. A method for mass propagation of *Aloe vera* by using different explants and different media with different PGR contain has been developed. Two type of explants (with and without sheath Type A and B respectively) were cultured on MS, B5 and SH media supplemented with different combination of different NAA with BA and Kin for Shoot induction. Highest rate of shoot induction observed in MS medium supplemented with 0.2 mgL⁻¹ NAA and 4 mgL⁻¹ BA in type A explants. Also, the highest shoot proliferation response obtained successfully by using MS medium containing 4 mg l⁻¹ BA. The optimal rooting response was observed on B5 medium supplemented with 2 mg l⁻¹ NAA, on which 100% of the regenerated shoots developed roots with an average of 7.8 roots per shoot within 3 weeks. The plantlets were acclimatized and transferred to greenhouse with 95% success. This *in vitro* propagation protocol should be useful for conservation as well as mass propagation of this medicinal plant.

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EFFECT OF SALINITY AND SEED PRIMING ON PURPLE CONEFLOWER (*ECHINACEA PURPUREA* L.) GERMINATION AND SEEDLING GROWTH INDICES

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Purple Coneflower is a medical herb that causes to stimulate and strengthen the immune system. Priming technique is one of the increasing germination characteristics and seed emergence methods under stress conditions which the seeds before sowing and exposure to variable conditions, achieve physiological and biochemical fitness to germination. The objective of this research was to evaluate effect of salinity and priming on Purple Coneflower germination and seedling growth indices. Experiment was conducted by using seed in randomized complete block design with four replications that germinated at the Seed Technology Laboratory of Yasouj University, Iran, in 2011. Treatments were included of three priming levels (zero (no Prime), Hydro priming and osmopriming by KH₂PO₄) and five levels of salinity (zero (control), 50, 100, 150 and 200 mM sodium chloride). Results showed that simple and interaction effects of salinity and Priming types on germination characteristics were significant. All germination and seedling growth traits were decreased by increasing the salinity levels. But seed priming application improved the germination percent, rate and index, root and shoot length and dry weight of Purple Coneflower under salinity. So that Hydro priming increased the germination traits until 150 mM salinity. But in 200 mM salt stress concentration, osmopriming by KH₂PO₄ had the maximum effect on them. Highest root and shoot length and dry weight and seed vigor also was obtained with KH₂PO₄ Priming.

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EFFECT DETERMINE OPTIMUM OF HARVEST TIME OF ESSENTIAL OIL AND THYMOL CONTENT OF (*THYMUS VULGARIS* L.) AND (*THYMUS DAENENSIS* CELAK) IN ISFAHAN PROVINCE

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The *Thymus* genus belongs to Lamiaceae family. *Thymus* essential oils have been used for many thousands of years, especially in food preservation, pharmaceuticals, alternative medicine and natural therapies. *Thymus* species have strong antibacterial, antifungal, antiviral, antiparasitic, spasmolytic and antioxidant activities [1]. (*Thymus daenensis* Celak) Bunge is one of the endemic species of this genus in Iran[2]. The published results reveal that major volatile constituents obtained from the aerial parts of thyme are Thymol, Carvacrol, Geranial, and Linalool [1]. In order to determine optimum of harvest time. This plan was done in a random block design with three replications was conducted in field Islamic Azad University Khorasgan (Isfahan) 2009 and 2010. Treatment phenological stages such as: 1) before flowering stage; 2) at beginning of flowering stage; 3) 50% flowering stage; 4) at full flowering stage and 5) at fruit set stage. In order to study the effects of content (%) and yield of oil, content (%) and yield of Thymol were measured. The essential oils obtained from the phenological stages of *Thymus daenensis* and *Thymus vulgaris* were analyzed by using GC/MS. The results obtained in our study showed that the effects phenological stages had very significant effect ($P < 0.01$) on Thymol percent on two species. The highest essential oil content *T. daenensis* (1.41%) was extracted at the 50% flowering stage and the highest essential oil content *T. vulgaris* (2.42%) was extracted at the beginning of flowering stage. Analysis and identification of components showed Thymol main compounds in all samples. The highest Thymol content *T. daenensis* (84.1%) was extracted at the before flowering stage and the highest Thymol content *T. vulgaris* (74.8%) was extracted at the full flowering stage. According to the results of this project at fruit set stage for *T. daenensis* and at 50% flowering stage for *T. vulgaris* optimum of harvest time on the Quantity/Quality of Essential oil and Thymol yield.

Aim of the present work was to determine optimum of harvest time on the Quantity/Quality of Essential oil and Thymol Content of (*Thymus vulgaris* L.) and (*Thymus daenensis* Celak) in Isfahan province.

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COMPARISON OF AGROMORPHOLOGICAL PROPERTIES OF GERMAN CHAMOMILE UNDER DIFFERENT SOIL TYPES OF CHAHARMAHAL-VA-BAKHTIARI PROVINCE, IRAN

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German chamomile is one of the most representative medicinal plants. It is an annual herb which grows wild, but is also cultivated in many countries because of the great interest of pharmaceutical, cosmetics and food industries [1]. The environmental conditions are major limiting factors in crop production as they affect almost all plant characteristics [2]. Thus, the identification of representative soil types having different soil properties could help us to find suitable locations for chamomile production. The objective of the present study was to compare agromorphological characteristics of German chamomile cultivated under ten soil series of Chaharmahal-Va-Bakhtiari province, Iran. Soil samples were collected from 0-30 cm depth of the soil series and soil properties including pH, EC, gravel, particle-size distribution, soluble K^+ , Ca^{2+} and Mg^{2+} and SO_4^{2-} , Total N, available P, % CO and % $CaCO_3$ were measured. A pot experiment was carried out in a Randomized Complete Block Design (RCBD) with three replications under green house condition. Number of flowers, fresh and dried flower yield, flowers diameter, number of tillers and plants height were measured within harvesting. Most of the soil characteristics showed a significant difference among different soil series. Significant difference was also found for most of the plant agromorphological characteristics cultivated in different soil types. However, no significant difference could be detected between the soil series with the highest crop yield compared with the lowest one except for sulfur content and silt percentage among different soil characteristics. Results suggest that some other soil properties except those considered in this study may affect chamomile growth under the experimental condition. Multivariate analysis may also give better understanding for unexpected results obtained from univariate analysis. The effect of fertilizer on agromorphological properties of chamomile is also suggested.

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**THE STUDY ON ALLELOPATHIC EFFECTS BERMUDAGRASS (*CYNODON DACTYLON* (L.)PERS.)
EXTRACT ON GERMINATION AND SEEDLING GROWTH ON BASIL (*OCIMUM BASILICUM* L.)**

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Weed interference is one of the most restrictive factors in agricultural yield. This interference is often due to the allelopathic effects of the weeds. Bermudagrass is one of the most important weed families Poaceae that grows fields [1]. In order to evaluate the allelopathic effects of (*Cynodon Dactylon*) on germination and early growth of Basil, an experiment was conducted in Research Islamic Azad University of Khorasgan (Isfahan) in 2009. The experiment was arranged as a factorial in a completely randomized block design with three replications. The experiment consisted of four stubble concentrations (control, 25, 50 and 100 g/L) and Basil Plant. Statistic analysis showed that the allelopathic effects (*Cynodon Dactylon*) extract on radicle weight, coleoptile weight, radical Length and coleoptile Length were significantly but germination percent not were significantly. The comparison between the average traits proved that by increasing the concentration of extract (100 g/l), the seedling growth on Basil decreased. Based on the results of this investigation by increasing the concentration of extract (100 g/l), the germination and seedling growth on Basil decreased.

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EFFECT OF K APPLICATION ON MINT IN AQUAPONIC SYSTEM

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An aquaponic system was designed to investigate effects of foliar applications of K on growth and physiological characteristics of mint. Common carp was stocked in the rearing tanks at 40 fish m⁻³. The fish were fed three times daily with a pellet diet containing 46% protein. Pots containing ten days old seedlings were transferred on to growth bed units of aquaponic system after stocking of carp fish for 3 months in the rearing tanks. Foliar nutrients application began 20 days after planting. Plants were sprayed at the rate of 250 ml plant⁻¹ with 2 g L⁻¹ K₂SO₄ twice a week. The results showed that, fresh and dry mass of shoots and roots and LAI in plants were higher in K treated plants. K concentration increased with K spray in the leaves of mint plants. Values of SPAD index and total chlorophyll concentration in plants decreased significantly at untreated plants. Performance index (PI) and maximal quantum yield of PS II photochemistry (Fv/Fm) did not affected by K. Zn concentration in the shoots and manganese concentration in the roots of mint was higher in K-treated plants compared to control. These results indicated that foliar application of K can effectively alleviate nutrient deficiencies in mint plants grown in aquaponic solution.

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EFFECT OF THE SOILLESS CULTURE SYSTEMS ON THE GROWTH AND DEVELOPMENT, ESSENTIAL OIL AND MINERAL ELEMENT CONTENT IN TWO CULTIVARS OF IRANIAN LOCAL BASIL

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Basil (*Ocimum basilicum*) is an herb belongs to lamiaceae family. The essential oil of basil is widely utilized as an aromatic agent in the food, pharmaceutical and aromatherapy industries. Basil essential oil possesses antimicrobial property. Due to high economical value and high demand, basil production in greenhouse for permanent market selling is expanding. In order to the investigation of the effect of soilless culture systems on yield and essential oil content of basil an experiment was arranged as a factorial in the framework of a completely randomized design with two factors, growing system (aquaponics and hydroponics) and varieties (green and violet basil) with 3 replications. The results showed that the most of the growth factors in two cultivars were higher in the hydroponics compared with aquaponics. So that, shoot and root fresh and dry mass, height, leaf area and node number per plant were higher in hydroponics than aquaponics. SPAD value was affected by growing system treatments and it was higher in hydroponic system. Essential oil content in shoots was not affected by the systems or cultivars. Lower amount of N, P and Mn in shoots were probable reasons of lower SPAD value and growth reduction of plants in aquaponics compared with hydroponics. Notwithstanding, plants growth were normal and there were no deficiency symptoms in aquaponic-grown plants. Thus, nutrient deficiency in aquaponic system might be alleviated by increasing of the fish number per water volume unit and elevation of feeding of fish and this system has potential of medicinal plant production.

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OIL OF *CARTHAMUS OXYACANTHA* M.B.

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Carthamus oxyacantha (Family: Asteraceae, Tribe: Cynareae), as one of the annual wild species of safflower, is widespread in Turkey, subtropical regions of western Iraq, Iran, northwest India, Kazakhstan, Turkmenistan, and Uzbekistan [1]. This species is important because it is assumed to be the ancient male parent of cultivated safflower. *C. oxyacantha* was chemically investigated. Sesquiterpen-Glycosid from *C. oxyacantha* has been elucidated by Rustaiyan *et al* [2]. Also, the fatty acid composition of *C. oxyacantha* oil has been reported by Sabzalian *et al*. [3]. The oil content of *C. oxyacantha* is $25.34 \pm 2.98\%$ and its oil composition consists of 7.28 ± 0.55 , 3.16 ± 0.60 , 17.08 ± 1.37 and $70.61 \pm 2.27\%$, Palmitic (C16:0), Stearic (C18:0), Oleic (C18:1), and linoleic (C18:2) acids, respectively. The hydro-distilled essential oil of the aerial parts of *C. oxyacantha* was analyzed by GC and GC/MS methods for the first time. One hundred six compounds, accounting for 93.1% of the total oil, were identified. The main components of the oil were 1-Pentadecene (32.7%) and Agarspirol (11.8%). The antimicrobial activity of oil was determined against two bacteria and one fungal strain. The results of inhibition zone showed that this oil was active against some of the tested strains. The oil antioxidant activities were measured by DPPH assay and β -carotene-linoleic acid tests. The essential oil significantly reduced the concentration of DPPH free radical (22.3%), with an efficacy lower than that of trolox (35.9%). Also, a 29.8% inhibition was noted in formation of peroxidation products in β -carotene bleaching test.

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16, 17 May 2012
Kish Island



DETERMINATION OF CARDINAL TEMPERATURES FOR GERMINATION OF INDIGO
(*INDIGOFERA TINCTORIA* L.)

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Indigo is an unknown plant for most of the people, and recently has derived attention due to its high content of necessary amino acids, and industrial and medical properties. There is scarce information about its response to environmental factors and agronomic practices. This study aimed at determination of cardinal temperatures for germination. The seeds were germinated in germinator with temperatures of 15, 17.5, 20 and 40 °C in Seed Technology Lab of Shahrood University of Technology, Iran. The germinated seeds were counted twice a day. A non-linear mathematical function was fitted on the data of cumulative germination percent against time, and then time to 50% germination was interpolated. The inverse values of time to 50% germination were considered as germination rate and dent like, segmented, beta and quadratic functions were tested for adequacy. Based on indices like RMSD (root mean square of deviations), correlation coefficient, and linear regression parameters, the quadratic function could predict the germination more precisely. The base, optimum and ceiling temperatures were 10.27, 28.26 and 39.50 °C, respectively. The biological days (the minimum number of days required for germination under optimum temperature conditions) tended to be 1.21.

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EFFECT OF CHLOROFORM EXTRACT OF *ZIZIPHORA CLINOPODIODES* ON
INFLAMMATION IN MALE MICE

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In various cultures and also community medicines, this plant has got different names and different usage as well, including pain sedation in body parts like legs, backbone and also is used to eliminate body-aloofness and its resulting pains, in line with disinfection and inflammation effacement. Because of those above mentioned reasons, this herb and its anti-inflammation properties are investigated in this research.

This study has been done on NMRI male mice of 20-25 g in weight. In inflammation test, they were divided into 5 groups, including the sham group, positive control (receiving dexamethasone with a dosage of 15 mg/kg) and 3 groups with receiving dosage of 250, 500 and 1000 mg/kg of chloroform extract of *Ziziphora clinopodioides* leaves, and xylene was used to maintain inflammation. All of drugs were injected of intraperitoneally 15 minutes before the test.

The resulting data were analyzed through of one-way-ANOVA and Tukey post test. Chloroform extract of *Ziziphora clinopodioides* leaves with dosage of 250, 500 and 1000 mg/kg ($p < 0.001$) caused a meaningful decrease in inflammation. Chloroform extract of *Ziziphora clinopodioides* leaves, has got anti-inflammation properties. This effect may be monoterpens specially Pulegone in chloroform extract.

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16, 17 May 2012
Kish Island



THE EFFECTS OF DIFFERENT IRRIGATION INTERVALS AND PHOSPHOROUS FERTILIZER ON OIL YIELD AND ESSENCES PERCENTAGE OF BLACK CUMIN (*NIGELLA SATIVA*)

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Black cumin is one of the most important pharmaceutical plants that have characteristics like increasing mother's milk, antibacterial, antivirus and anti epilepsy. In order to affect of different irrigation intervals and phosphorous fertilizer on qualitative characteristic of black cumin (*Nigella sativa*). A field experiment was conducted at research station of Payame Noor University, in growing season 2010. Three irrigation intervals (irrigation after 50, 80, 110 mm evaporation from pan class A) and five phosphorus fertilizer (0, 25, 50, 75, 100 kg/ha) were compared in a split plot based on complete randomized block design with four replications. Results showed that irrigation intervals had significant effects on all studied characteristics. Increasing irrigation intervals reduced percentage and yield of oil and essences of black cumin grains. Phosphorus fertilizer did not have significant effects on percentage of oil and essences of black cumin grains. There were significant difference between different phosphorus fertilizer in terms of oil and essences yield of black cumin grains. Between all treatments, irrigation after 50 mm evaporation with 100 kg/ha phosphorous had the highest oil and essences yield (427 and 13.9 kg/ha) respectively [1-3].

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EFFECT OF ESSENTIAL OIL OF THYME AND GIRALDI DAPHNE ON EXTENDING VASE-LIFE OF LISIANTHUS (*EUSTMA GRANDIFLORUM*)

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Essential oils are natural products taken from plant materials that, due to their antibacterial, antifungal, antioxidant and anticarcinogenic properties can be used as natural additives in many crops [1].

In this study we investigated the effect of some essential oils in extending the vase-life of Lisiantus (*Eustma grandiflorum*) cut flowers. For this purpose a factorial trial based on completely randomized design was conducted with 3 replications in controlled lab conditions (temperature and light). Cut flowers of lisiantus were kept in solution containing essential oils of Thyme and Giraldi daphne at (0, 50, 100 and 150 mgL⁻¹). The result showed that essential oils increased the vase life, fresh weight, stomatal conductance and solution uptake conductance significantly in compared to control. Mean of vase life of flowers in control soluble was 8.21, whereas the mean of vase life in flowers which treated with Thyme and Giraldi daphne were 11.25 and 13.56. application of essential oil decreased the process of water losses and kept freshness of flowers. The highest stomatal conductance (16.74 mmolbar/m²) was obtained with solution Giraldi daphne (150 mgL⁻¹). Application of solutions containing of essential oils on cut flowers traits in comparison control had especially effects (vase life and flower fresh weight losses) however solution containing Giraldi daphne essential oils was more effective than control and some concentrations of other concentration essential oils.

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ADAPTION OF THE OLD NAMES OF DIFFERENT KINDS OF “JAWZ/ DJAWZ”ES IN
TRADITIONAL MEDICINE BOOKS OF ISLAMIC PERIOD TO SCIENTIFIC NAMES

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“Jawz/ Djawz” in old pharmaceutical and medical books of Islamic period, alone or with some words is applied for different plants. Because of great variety of plants bearing the word “Jawz” in their full name, and also the medicinal and commercial importance of some of them, identifying their correct nature and botanical scientific names has special importance. The main method for identifying the exact nature of plants inserted in old books of Islamic period is detailed study of morphological description of each plant. But unfortunately the medico-pharmacological authors of the Islamic period have briefly described several kinds of “Jawz”es, which cannot be always identified with certitude because of inadequate morphological descriptions or confusion in terminology. Therefore it is very difficult to identify their correct scientific names.

This problem has caused the necessity of more investigations and using more references for finding an acceptable result. Therefore, more than 10 kinds of the most important “Jawz”es in Islamic and traditional medicine have been studied in this research and the most probable scientific names were chosen for them. For example “Jawz” is *Juglans regia* L. (walnut), “Jawz-e Jandom” is the juicy and edible fruits of *Garcinia mangostana* L., and “Jawz-o’l-ttarfā” is the fruit of *Tamarix galica* L. (tamarisk/ manna tree).

SOME FRUIT CHARACTERISTICS OF CORNELIAN CHERRIES (*CORNUS MAS* L.) GROWING IN
QAZVIN PROVINCE

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This study was carried out on local morphologic of cornelian cherry (*Cornus mas* L.) grown in 11 area in Qazvin province (Iran). Four trees were selected in systematic random manner each area. Characteristics such as crown height, crown diameter, fruit length, fruit width stone weight, flesh/stone ratio were measured. Fruit length ranged from 18.9 to 20.6 mm and fruit width ranged 13 to 13.5 mm. Fruit weight ranged from 2.3 to 2.6 g and stone weight ranged from 35 to .47 g. Crown high was the lowest as 4.33 m and the highest as 5.06 m and crown diameter were measured from 3.8 to 4.6 m. Flesh /stone ratio were between 5.5 to 7.

The present study showed that there was enough variability among cornelian cherry trees grown in some ecological conditions of a small area that could be important both to improve value through germplasm enhancement programs [1, 2].

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STUDY OF THE QUANTITATIVE AND BIOCHEMICAL CHARACTERISTICS OF *ZIZIPHUS* FRUITS ECOTYPE IN GOLESTAN PROVINCE

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Ziziphus jujube is belonged to Rhamnaceae family. It is widely used in Iranian traditional medicine for the treatment of insomnia and anxiety. Important nutritional properties of jujube fruits relate particularly to their being sources of vitamin C, P and vitamin B complex in the diet. In this research quantitative and biochemical characteristics of ziziphus fruit in Golestan province was studied. Characteristics was measured: vitamin C, pH, TSS, fruit and stone size, fruit and stone weight, flesh to stone ratio, humidity percentage. The results of this study showed significantly differences between ecotypes in different region so, it can be concluded that, the climate effects is very important for qualitative and quantitative characteristics of *ziziphus*.

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APPLICATION OF *IN VITRO* CULTURES FOR GERMINATION AND TUBERIZATION OF BLACK ZIRA (*BUNIAM PERSICUM*)

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Black zira (*Bunium persicum*) is a medical and spice plant that is native in a limited area of the West of Asia and the Eastern parts of Iran. In this experiment the growth of Black zira from germination to the seeding and tuberization were investigated *in vitro*. Germination of black zira seeds on a simple medium containing 0.5 percent sugar was better than others. It happened in dark at 4 °C after at least 3 - 4 weeks. The seedlings were cultured on MS basal medium and then stored at 25°C and 16 hrs photoperiod. At this conditions cotyledons appeared and then a single tuber formed at the end of the root. The true leaves appeared one month after tuber formation. The effect of different concentrations of sugar on tubers size was found to be non significant. While the MS medium with different levels of nitrogen and ammonium to nitrate ratios were significant. The MS medium containing 30 mM nitrogen was more effective than 60 mM on the tuber size (length and diameter). The production of larger tubers requires both sources of nitrogen (ammonium and nitrate), but nitrate source was found to be more effective. The effect of different strengths of MS medium (MS, ½ MS, MS with ½ NO₃ content) on weight, length and diameter of tuber was statistically non significant, but in all of traits, ½ MS medium had higher means.



BIOLOGICAL ACTIVITIES OF *CARDARIA DRABA* L. (DESV.) ESSENTIAL OIL

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Cardaria (syn. *Lepidium*) *draba* (Family: Cruciferae syn. Brassicaceae) is a medicinal plant growing wild in different parts of Iran and decoction of the plant has diuretic action [1]. The fruits were previously used as condiment instead of pepper [1]. Likewise, *C. draba* has been chemically investigated. 2-propenyl, 4-pentenyl, 4-methylthiobutyl, 4-hydroxybenzyl, 3-butenyl and 4-methylsulfinylbutyl glucosinolates were reported from leaves of *C. draba* [1]. Also, 4-methylthiobutyl and 4-methylsulfinylbutyl glucosinolates were identified in seeds of *C. draba* [1]. Optimization of batch extraction, countercurrent extraction, bioactivity and toxicity testing of glucoraphanin from *C. draba* were studied [2]. Constituents of the aerial parts, fruits and roots of *C. draba* oil were analyzed by GC and GC/MS. The major constituents of this different part were isothiocyanate and sulfinylbutyl isothiocyanate, hydrocarbons, fatty acids and some monoterpenes [1,3]. The essential oil of the aerial parts of *C. draba* from alamut region (province Qazvin) was identified by hydro-distillation and diethyl ether extraction. The oil analyzed by GC and GC/MS methods. One hundred compounds were identified. The main components of the oil were Z-phytol (12.9%) and β -Ionone (4.5%). The antimicrobial activity of oil was determined against two bacteria and one fungal strain. The results of inhibition zone showed that this oil was active against some of the tested strains. The oil antioxidant activities were measured by DPPH assay and β -carotene-linoleic acid tests. The essential oil reduced the concentration of DPPH free radical (19.5%), with an efficacy lower than that of trolox (58.7%). Also, a 55.0% inhibition was noted in formation of peroxidation products in β -carotene bleaching test.

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ANTIMICROBIAL AND ANTIOXIDANT ACTIVITIES OF ESSENTIAL OIL FROM *CENTAUREA DEPRESSA* M. B.

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Seventy-four species of the genus *Centaurea* are found in Iran, among which 38 are endemic [1]. Previous chemical investigation from *Centaurea* species has shown the presence of flavonoids and sesquiterpene lactones [2]. Also, the essential oils of *Centaurea* species such as *C. cineraria*, *C. napifolia*, *C. pseudoscabiosa*, *C. hadimensis*, *C. kotschyi*, *C. spruneri*, *C. calcitrapa*, *C. gloriosa* and *C. moschata* have been studied [3]. The essential oil from *Centaurea depressa* (collected from Tehran region) obtained by hydrodistillation has been analyzed by GC and GC/MS [2]. Piperitone (35.2%) and Elemol (14.1%) were the main components among the 26 constituents characterized in the oil of *C. depressa* representing 90.5% of the total components detected. In our study composition of hydro-distilled essential oil of *C. depressa* from alamut region (Qazvin province) was analyzed by GC and GC/MS. One hundred six compounds were identified. The main components were Germacrene D (13.5%) and Spathulenol (8.3%). The antimicrobial activity of oil was determined against two bacteria and one fungal strains. The results of inhibition zone showed that this oil was active against some of the tested strains. The oil antioxidant activities were measured by DPPH assay and β -carotene-linoleic acid tests. The essential oil reduced the concentration of DPPH free radical (16.1%), with an efficacy lower than that of trolox (51.3%). Also, a 45.3% inhibition was noted in formation of peroxidation products in β -carotene bleaching test.

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16, 17 May 2012
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IN VITRO HYOSCYAMINE AND SCOPOLAMINE PRODUCTION OF BLACK HENBANE (*HYOSCYAMUS NIGER*) FROM SHOOT TIPS UNDER VARIOUS PLANT GROWTH REGULATORS AND CULTURE MEDIA TREATMENTS

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Tropane alkaloids, especially hyoscyamine (HYO) and scopolamine (SCO), are widely used in medicine for their mydriatic, antispasmodic, anticholinergic, analgesic and sedative properties. Because of the complex chemical structures of these alkaloids, industrial synthesis has been found to be prohibitively expensive and therefore they are mainly obtained from plant resources of *Solanaceae* family like *Hyoscyamus niger*. This study was undertaken to investigate the root and shoot tropane alkaloids production from *in vitro* shoot apical meristem (as explant) culture of *H. niger* under different plant growth regulators including auxins (IAA, 2,4-D, IBA, NAA), cytokines (KIN, BAP) with different concentrations (0.5, 1 and 2 mg.l⁻¹) and two media of full and modified MS (½ NH₄NO₃, and ½ KNO₃ compared to those concentration in MS medium) treatments. Alkaloids extracted were analyzed by Gas chromatography /mass spectra (GC/MS) analysis using a Younglin Acme 6000 GC system equipped with a flame ionization detector (FID) and HP-5MS capillary column (30 m × 0.25 mm, film thickness 0.25 µm).

The identification of alkaloids was based on the comparison of their GC retention time and mass spectra data with their standards substances (HYO. HCl and SCO. HBr, Merck). The results showed that the highest alkaloid content values in root (HYO: 0.2 %DW; SCO: 0.076 % DW) obtained in full MS medium containing 0.5 NAA & 1BAP. Whereas, in the shoot tissue the highest HYO (0.394 %DW) and SCO (0.234 %DW) found on modified MS medium supplemented with 1BAP & 0.5IBA. The maximum total alkaloids (HYO + SCO) yield (0.269 mg.plant⁻¹) was also obtained on full MS medium supplemented with 0.5NAA & 1BAP.

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FATTY ACIDS FROM SEED OF *CAPPARIS SPINOSA* L.

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Capparis Spinosa is a medicinal plant distributed in different locations in Iran. In many countries, young shoots, flower buds, fruits and seeds of *C. spinosa* are used as nutritional, drug or cosmetic additives [1]. Only a few studies on the compositional properties of *C. spinosa* seed oil. Fatty acids composition of oils of *C. spinosa* from four Qazvin regions and one south region was determined. The oil content of the seeds ranged from 20.69 to 32.2% on a dry weight basis. The Fatty acid composition of the oil was determined by gas chromatography as fatty acid methyl esters. In Qazvin samples Linoleic acid with 47.71% was the main fatty acid. Followed by Oleic acid (37.87%), Palmitic acid (7.51%), Stearic acid (2.2%) Palmitoleic acid (1.7%) whereas Oleic acid was the main fatty acid in South sample with 47.76%. Followed by Linoleic acid(38.2%), Palmitic acid (6.3%), Stearic acid (2.36%) Pamitoleic acid (2.1%). These differences might be related to different geographic and climatic conditions or may also reflect genetic variability. Indeed, previous studies have shown that these compounds can be affected by location [2, 3].

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STUDY ON EFFECT OF *FOENICULUM VULGARE* OIL, *CARUN COPTICUM* OIL, EXTRACT OF PROPOLIS AND *NIGELLA SATIVA* ON DECREASING OF AFLATOXIN PRODUCTION IN EXPERIMENTAL CONTAMINATION OF ARTEMIA CYST WITH *ASPERGILLUS PARASITICUS*

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Today, Botanical extracts and therapeutic aspects of dietary supplement for increasing productivity in the livestock industry in poultry World to have a special place and the side effects of many chemical compounds, to Use herbs instead of drugs and emphasize the many researchers studying and evaluating Various plants and their therapeutic effects are discovered so many different plants with therapeutic effects have introduced the medical world. Propolis is produced by bees from the resins of sprouts, exudates and other parts of plant tissues. This study evaluated the effect of alcoholic extract of black beans, Essential oil of fennel and Ajowan, and ethanolic extract of propolis in decreased production of total aflatoxin-contaminated Artemia experimental *Aspergillus Parasiticus* has been obtained with formalin in the usual way to fight anti-fungal there is a fungal disease, has been compared. Cyst purify obtained by method of floating on the surface. Purified cysts were dry. To obtain inocula, *Aspergillus parasiticus* (PTCC: 5186) isolates were grown on CZAPEK agar and incubated at 28°C for 24 h. The fungal isolates were grown on sabouraud agar under the same conditions. For experimental contamination, 5g of Artemia cystes prepared and with 0/5cc fungal suspension mixed in Erlen Mayer. Serial concentrations of ethanolic extract of propolis (200µl) added on samples. The Artemia cysts were contaminated experimentally using a suspension of fungal agents, *Aspergillus parasiticus* spores (10⁸/ml). In order to evaluate the inhibitory effect of Propolis extract, *Foeniculum vulgare* oil, *Carun copticum* oil, *Nigella sativa* extract (in three dose levels of 250, 500, 1000 ppm) which were prepared using DMSO. Formalin at 100 ppm level use as positive control. Total Aflatoxin contamination was investigated using ELISA. The results of this investigation showed that *Carun copticum* oil at the level of 1000 ppm was having the maximum inhibitory effect on total Aflatoxin levels and also CFU count in Artemia cysts (p, 0.001).

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INVESTIGATION ON ANTIFUNGAL EFFECTS AND MORPHOLOGICAL CHANGES OF *ZYGOMYCETES* PROXIMITY WITH *ZATARIA MULTIFLORA*, *CARUN COPTICUM*, *FOENICULUM VULGARE* MILL AND PROPOLIS ESSENTIAL OILS

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The plants have been used by man since ancient times for its pharmaceutical properties. Today, essential oils are still used as a popular remedy in folk medicine. Propolis is a natural substance collected by bees from plant sources which is used to seal holes and repair many structures in the hive Natural products are a promising source for the discovery of new pharmaceuticals. In the last decades, several works dealing with essential oil compositions and biological properties have been published, revealing the interest of researchers on these nature products and the potential for the development of new drugs as well. In the present study, antifungal effects and morphological changes of *Zataria multiflora*, *Carun copticum*, *Foeniculum vulgare* MILL and propolis essential oils (62.5 ppm, 125 ppm, 250 ppm, 500 ppm and 1000 ppm) on *Mucor hiemalia* and *Rhizopus oryzae* were studied. Morphological changes, Minimum Inhibitory Concentration (MIC) and Minimum Fungicidal Concentration (MFC) of essential oils against laboratory isolated of *Zygomycetes* were investigated. On the base of the present study, the essential oils of *Zataria multiflora*, *Carun copticum* and propolis can be used as effective combination against of *Zygomycetes* Fungi, also the essential oil of *Foeniculum vulgare* MILL can be effective in control of the microorganism. This study is report on the antifungal activities of essential oils *Zataria multiflora*, *Carun copticum*, *Foeniculum vulgare* MILL of and propolis against the plant pathogenic fungal.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE INHIBITORY ROLE OF PLANT EXTRACTS ON ACRYLAMIDE FORMATION AS THE MOST DANGEROUS FOOD POISONING IN FRIED PRODUCTS

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This paper investigated the efficiency of antioxidant of Thyme and extract of Rosemary on the reduction of acrylamide in potato chips and summarized the optimal levels of two additives. Seven experimental groups including a control group were organized for both of additives. Potato chips were made via traditional processing technology. The potato was mixed with different levels (0.001-3.5 g/kg flour) of Thyme and rosemary, respectively. The acrylamide level in potato chips was determined by Gas chromatography (GC/FID). Results showed that nearly 81.6% and 70.7% of acrylamide were reduced when the Thyme and Rosemary addition levels were 1 and 0.1 g/kg, respectively. The elevated inhibitory effects of Thyme and Rosemary on the acrylamide formation were achieved with an increase of additive levels unless the spiking levels of Thyme and rosemary extracts were greater than 1 and 0.1 g/kg, respectively. The present study indicated that both Thyme and Rosemary could significantly reduce the acrylamide content generated in potato chips and keep original flavor and crispness of potato chips. This study could be regarded as an important contribution on the reduction of acrylamide by natural antioxidants.

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EFFECT OF RAW GARLIC AND GARLIC ESSENTIAL OIL ON *IN VITRO* FERMENTATION OF FEED WITH SHEEP RUMEN LIQUOR USING GAS PRODUCTION TECHNIQUE

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The aim of this study was to assess the effect of raw garlic (GAR) and garlic essential oil (EO) supplements as a dietary additive to rumen liquid fermenters, and to compare its effect with monensin (MON) supplementation as a positive control.

Monensin has been used widely in ruminants to modify rumen fermentation. However, using monensin as a feed additive has raised welfare and public health concerns related to antibiotic resistance. Therefore, a goal for nutritionists in this area would be to find new additives to modulate microbial activity in the rumen. Among the proposed alternatives, plant extracts are being studied because they are known to contain active compounds with numerous effects including antimicrobial activity. The essential oil component of garlic has been shown to be a special case. They are very active against a wide range of gram-positive and gram-negative bacteria, fungi, parasites, and viruses. So the present study set out for evaluation the effects of inclusion of garlic essential oil at 33, 66 and 100 µg/ml, raw garlic at 5, 10 and 15 mg/ml and monensin at 7.5 µg/ml of incubation medium on organic matter digestibility (OMD) using *in vitro* gas production technique. The material was incubated with sheep ruminal fluid and the experimental design was a completely randomized design. Cumulative gas production was recorded at 0, 2, 4, 6, 8, 12, 16, 24, 36, 48, 72 and 96 h of incubation.

In the present study, raw garlic was shown to have the potential to modify *in vitro* ruminal fermentation and to increase gas production volume compared to monensin. Moreover, our results showed suppressing effects of EO on OM digestibility. Also the potential of gas production and rate of gas production for EO and MON were the lowest; however, these variables were higher for GAR supplemented groups. It was concluded that raw garlic could be of great interest for its usage as a modulator of ruminal fermentation.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



STUDY OF THE MEDICINAL PLANT ETNOBOTANICAL SPECIES OF KAZEROON
IN FARS PROVINCE

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Little is known about medicine and pharmacology in Iran in pre-Islamic times. The traditional Iranian pharmacology in the Islamic period was based on Hippocratic and Galenic concepts of medicine [1]. Kazeroon, with an area of about 4060 km², is situated at 110 km in the west of Shiraz city (The center of Fars province, Iran). This area is important for plant biodiversity, due to the presence of some important habitats such as international lake of Parishan in the southeast, woodlands of *Quercus persica* in the east and branches of Shahpoor river in the west of the region [2]. Approximately, 60 % of this area is surrounded by mountains of Zagros Range. In this work the medicinal vascular angiosperm plants of this region were collected, identified and studied for medicinal usages. As a result, 90 species belonging to 87 genera and 39 families of angiosperms were reported from the rangelands around the Kazeroon. Lamiaceae, with 11 species, and Asteraceae with 9 species were the largest families respectively, and *Plantago* (Plantaginaceae) with 3 species was the largest genus in the medicinal flora of this area. Phytogeographically, 51.11% of species (46 species) were Irano-Turanian elements and from the standpoint of plant life forms, about 50% species (45 species) were Therophytes. Local medicinal usages of these plants were also reported.

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ANTIBACTERIAL EFFECTS OF *ALTHAEA OFFICINALIS* AND *ALTHAEA ROSEA* ALCOHOLIC EXTRACTS

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The four full seasons and the various climates in our country Iran, have certainly contributed to the variety of flora in Iran, some of them demonstrate wonderful therapeutic effects. This is of particular interest when one considers such problems as antibiotic resistance and other side effects of synthetic drugs which have caused global interest in the growth of new disciplines such as pharmacognosy [1].

Althaea officinalis belongs to family Malvaceae. It is one of the medicinal plants used therapeutically since ancient time. The flower, the leaves of the *A. officinalis* plant as well as the root are used as medicine [2].

In this study, the flowers of *Althaea officinalis* and *A. rosea* were collected from around the Arak city. Flowers of *Althaea officinalis* and *Althaea rosea* conditions were dry in the shadow. Powder with 85% ethanol maceration for 48 hours was infused. Solution after soaking the filter paper was passed and they were used for Antibacterial effects. Antibacterial effect was studied in of the agar well diffusion method in Mueller Hyngton Agar [3].

Flower Alcoholic extract of *A.officinalis* showed antibacterial effects with 10 mm inhibition zone diameter on the bacterium *Staphylococcus aureus* and 17 mm on the *Staphylococcus epidermidis* and Flower alcoholic extract of *A. rosea* showed antibacterial effects with 15 mm inhibition zone diameter of on the bacterium *Staphylococcus aureus* and 19 mm on the *Staphylococcus epidermidis*. Analyse was studied by SPSS.

In comparison with each other, *Althaea rosea* was the most effective against the bacteria used in this study. The results provide evidence that *Althaea officinalis* and *Althaea rosea* might indeed be potential sources of new antibacterial agents.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EVALUATION OF VOLATILE COMPONENTS OF FRESH, SALTED AND DRIED CORM OF
PERSIAN SHALLOT (*ALLIUM HIRTIFOLIUM* BOISS) USING HEADSPACE/GC-MS

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The corm of *Allium hirtifolium* Boiss., an Iranian endemic plant widely used in Iranian people food recipes, is named Musir. *A. hirtifolium* contains some useful biological secondary metabolites, which include alliin, alliinase, allicin, S-allyl-cysteine (SAC), diallyldisulphide (DADS), diallyltrisulphide (DATS), and methylallyltrisulphide. Alliin is converted to allicin when its bulbs are crushed. Allicin have been reported in treatment of cancer. The volatile components from fresh, salted and dried from the shallot corm were identified and analyzed by HS (headspace)-GC/MS on the Combi PAL System technique. The numbers of volatile compound identified in the fresh, salted and dried corm were 14, 16 and 20, respectively. The main components of the fresh corm were Methyl methylthiomethyl disulfide (2, 3, 5-Trithiahexane) (42.45%) and α -Pinene that of the salted and dried corm were 1,8-Cineole (37.78%) and Camphor. Some compounds such as α -Phellanderene, α -Terpinene and *n*-Tetradecanal only detected in dried corm.

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ESSENTIAL OIL CONSTITUENTS OF *MYRTUS COMMUNIS* L. GROWING AT DIFFERENT
ALTITUDES IN IRAN

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Myrtus communis L. (Myrtaceae), myrtle, is an evergreen shrub, Essential oil from leaves, flowers and fruits of the plant is widely used in food and cosmetic industries. Essential oils of *Myrtus communis* plants growing at different altitudes (792, 889, 1284, 1349, 1417, 1480, 1640 and 1763 m) in Fars Province were hydro-distilled and analyzed by GC-GC/MS. The major constituents of the oil show variation with changes in altitude. At lower, middle and higher altitudes, the major constituents of the oil were α - Pinene, 1,8-Cineol, Linalool, α -Terpineol and Limonen, respectively. At the lower altitudes of Kazeron (792 m) and Semakan-Jahrom (889 m), α - Pinene (48.7%), 1,8-Cineol (24.3%), Linalool (7.5%) and α -Terpineol (3.9%) were the major constituent of the oil, on the other hand the percentages of α - Pinene decreased with an increase in altitude. At the middle altitudes, Eslam-abad (1284 m) and Atashkade-Firozabad (1349 m), α -Pinene decreased to 27.1% and 21.8%, respectively. The maximum of Limonene (11.9%) was observed in Rostagh (1417 m) and maximum of Linalool (28%) was identified at 1349 m altitude (Atashkade-Firozabad).

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Kish Island



COMPARING HEAVY METAL CONTENTS OF *ROSA DAMASCENA* FROM KASHAN'S FARMS
AND SELECTED MARKETS IN TEHRAN, IRAN

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Osa Damascena mill L., known as Gole Mohammadi in Iran is an ornamental plant and beside perfuming effect, several pharmacological properties including anti-HIV, antibacterial, antioxidant, antitussive, hypnotic, antidiabetic, and relaxant effect on tracheal chains have been reported for this plant [1-4].

However, little is known about the contents and origin of heavy metals in *Rosa Damascena* used as herbal plants.

To examine the Lead, Cadmium, Copper, Nickel and Mercury contents in *Rosa Damascena* dried flowers, 10 samples were collected from Kashan's farms and 10 samples were purchased from 10 different markets of the year 2011 in order to. A certain weight of each sample was digested using, later on were extracted and then analyzed by atomic absorption spectrophotometer.

The concentration levels of heavy metals on the samples were determined as mean \pm SD of three replicates in each test and determined based on sample dry weight. Results showed a significant increase in the Lead, Cadmium and Nickel in Tehran's markets compared to that were harvested from Kashan's farms.

By a comparison between acceptable global standards and the level of Ni, Cd and Pb on Gole Mohammadi investigated; our results showed that the majority of medicinal plants (flowers) samples from markets had higher level of these heavy metals. The results suggest that organization such as Health ministry help by carrying out premarket reviews of all medicinal - herbal plants and herbal drugs before they could be authorized for sale. The products available in the markets should be analyzed regularly to ensure that they are free of unsafe ingredients and that the products actually contain the ingredients indicated on the labels.

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VARIATIONS IN HYOSCYAMINE AND SCOPOLAMINE PRODUCTION OF BLACK HENBANE
(*HYOSCYAMUS NIGER*) ROOT AND SHOOT WITH NITROGEN APPLICATION AND WATER
DEFICIT STRESS

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Black henbane (*Hyoscyamus niger*) a species in solanaceae family has long been used as a medicinal plant. Nowadays, it is widely used for scopolamine (SCO) hydrobromide and hyoscyamine (HYO) sulfate tablets as anticholinergic, antispasmodic and sedative agents. In order to indicate the water deficit stress and nitrogen fertilization effects on alkaloids yield and content of *H. niger* plant parts (root and shoot) this experiment was conducted at the full flowering growth stage in greenhouse conditions. Alkaloids extracted were analyzed by Gas chromatography /mass spectra (GC/MS) analysis using a Younglin Acme 6000 GC system equipped with a flame ionization detector (FID) and HP-5MS capillary column (30 m \times 0.25 mm, film thickness 0.25 μ m). The identification of alkaloids was based on the comparison of their GC retention time and mass spectra data with their standards substances (HYO. HCl and SCO. HBr, Merck). Plants were treated with different nitrogen application (0, 75, 150 and 225 kg/ha N as ammonium nitrate in the form of solution, N0-N3) before the commencement of water deficit stress treatment (30, 60 and 90% depletion of water from field capacity, W1-W3). Results showed that the highest alkaloid content values in root (HYO: 0.281 %DW; SCO: 0.232 % DW) and shoot (HYO: 0.937 %DW; SCO: 0.416 %DW) achieved in plants grown under severe water deficit stress (W3) accompanied with nitrogen supply of 225 kg/h (N3). The maximum and minimum (20.52 and 8.95 mg.plant⁻¹) total alkaloids yield in whole plant obtained in N2W1 and N3W3 treatments, respectively.

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ASSESSMENT OF AQUEOUS EXTRACT OF *CYNODON DACTYLON* ON THE SERUM LIPID PROFILES IN TRITON INDUCED HYPERLIPIDEMIC RATS

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Hyperlipidemia, CHD, and atherosclerosis diseases contribute the major cause of human death. Hyperlipidemia is recognized by high concentration of LDL, VLDL and total cholesterol and low HDL-cholesterol. Hyperlipidemia expands the risk of CHD [1, 2]. Karthik and Ravikumar reported higher HDL-c and lower total cholesterol in blood rats fed *Cynodon dactylon* [3]. Therefore, this experiment was conducted to evaluate the aqueous extract of *Cynodon dactylon* on the serum lipid profiles in Triton WR-1339 induced hyperlipidemic rats. Forty-two adult male rats were randomly allotted to 6 groups (7 each). Two groups were fed 250 and 500 mg/kg *Cynodon dactylon* (CD) one week before triton injection. Two other groups were fed 500 mg/kg CD and 65 mg/kg fenofibrate after injection of triton for two days. Two control groups including hyperlipidemic rat and negative groups were treated for two days. Blood samples (2ml) of all rats were taken to study blood lipid concentration of rats at end of experiment. Data were collected and subjected to SPSS for statistical analysis. As a result, the LDL, total cholesterol and triglyceride were lower in rats fed 500 g/kg CD post injection of triton as compared to hyperlipidemic control group. HDL-cholesterol increased rats fed 250 and 500 g/kg CD pre and post triton injection. The rats treated with fenofibrate had lower LDL, Cholesterol and triglyceride and higher HDL-cholesterol as compared to hyperlipidemic control group. It is concluded that the *Cynodon dactylon* may reduce hyperlipidemia risk in rats. The *Cynodon dactylon* may decrease the LDL, cholesterol and triglyceride and increase HDL-cholesterol.

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TAXOL ANTICANCER DRUG PRODUCING FROM MEDICINAL PLANTS

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Plants are one of the most important sources of medicine in the recent years. A medicinal plant is any plant which in one or more of the organ contains substance that can be used for therapeutic purpose or which is a precursor for synthesis of useful drugs. Even today, plants are the most exclusive source of drugs for the majority of world's population and plant products constitute about 25% of prescribed medicines [1]. Taxol is a pharmaceutical compound in medicinal plant which was first extracted in the bark of yew (*Taxus brevifolia*). Taxol is an important anticancer drug used widely in the clinical field. It is a diterpenoids can kill tumor cells by enhancing the assembly of microtubules and inhibiting their depolymerisation. This compound is the world's first billion dollar anticancer drug and it is used to treat breast, lung, ovarian cancer and other human tissue proliferating disease. Taxol used in cancer chemotherapy and scientific research [2]. Taxol isolated from *Taxus* spp has limited availability of mature yew trees, slow growth rate of cultivated plants and the low yield of the taxol has resulted in its high cost and also, has raised the concerns due to environmental damage from excessive exploitation of wild trees. This makes taxol a financial burden for many patients [3]. It also produces from endophytic fungal fermentation. many researchers reported about taxol producing endophytic fungus isolated from phloem of yews[4].The observation on taxol producing endophytic fungi, *Pestalotiopsis terminaliae*, *Colletotrichum gleosporioides*, *Phyllosticta spinarum* and *Phyllosticta citricarpa*, has been reported and also demonstrated that, the organisms other than *Taxus* spp. could produce taxol. Thus, the endophytic fungi can produce taxol as a cheaper and more widely available product, eventually via industrial fermentation [5]. Taxol can purified using HPLC and further evidence confirming the identity of taxol was obtained by LC-MS spectroscopic analysis.

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EFFECTS OF EXOGENOUS SULFOSALICYLIC ACID ON ANTIOXIDANT ENZYMES ACTIVITIES IN LEAVES OF *BRASSICA NAPUS* L. UNDER MERCURY STRESS.

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Mercury, one of the non-essential heavy metals for plants, is frequently reported to be released into the biosphere. Sulfosalicylic acid (SSA) is one of the salicylic acid derivatives. They are natural signaling molecules activated by plant defense response to stresses. In this research, the effects of SSA and HgCl₂ on some physiological parameters in *Brassica napus* L. plants were studied. Seeds were sterilized and cultured in petri dishes. The seedlings were transferred to pots containing sand in a growth chamber with 16h light period per 24h and day/night temperatures of 25/18°C respectively. 10 days old plants were treated with SSA (0, 0.25 and 0.5 mM) and HgCl₂ (0, 5, 10, 15 and 25 μM) in nutrient solution. Plants were harvested after 21 days for measurements of biochemical and certain physiological parameters. The results showed that the catalase enzyme activity increased in plants treated with both SSA and HgCl₂, but superoxide dismutase enzyme activity decreased, also HgCl₂ alone enhanced superoxide dismutase enzyme activity. The results revealed that SSA in low concentrations, exhibit a protection role for the alleviation of mercury stress [1].

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EFFECT OF PHYTOHORMONES ON COMPOSITION OF *SAMBUCUS RACEMOSA* L. LEAF ESSENTIAL OIL

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Plant hormones are a group of chemically diverse molecules that control virtually all aspects of plant development. In this study the effects of growth hormones (NAA & IAA) on essential oil of *Sambucus racemosa* L. leaf were evaluated. The composition of the essential oil was analyzed by GC and GC-MS. 58 constituents were identified in plant oil. Some detected compounds can be responsible for the plants biological and/ or toxic activities. Results indicate that NAA and IAA have significant effect on the concentration of essential oil. Many components were increased and some of them decrease significantly. In some cases, the compounds were eradicated of induced completely. It seems a useful method for changing the concentration of the essential oil compounds [1-13].

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EFFECTS OF SALINITY ON QUALITY AND QUANTITY OF ESSENTIAL OIL COMPONENTS IN FLOWERING STAGE IN *ACHILLEA MILLEFOLIUM* L.

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Salinity is a growing problem in agricultural soils that affects plants growth and development. With regard to the development of saline lands and noting appropriate these lands to cultivate of crop plants, Study of salt tolerance in medicinal plants is very important due to cultivation in saline lands. An experiment was carried out using a completely randomized design in order to study the effect of salinity on *Achillea millefolium* in flowering stage in controlled environment of greenhouse condition with four treatments and four replications per treatment. Salinity levels included 0 (control), 50, 100 and 150 mM NaCl. Its essential oil was analyzed by GC and GC/MS. The result was not showed significantly differences in the essential oil yield at different salinity levels. Regarding the essential oil composition, the main compounds were δ -Cadinol (13.2%), δ -Elemene (12.4%), β -Sesquiphellandrene (12.1%), α -Bisabolol (11.6%), Cedr-8-en-13-ol (7.2%), Germacrene-D (5.3%), *trans*- β -Farnesene (4.9%), Caryophyllene oxide (3.5%), Borneol (3.5%), at all salt treatments. Some compounds such as Sabinene, *cis*- β -Ocimene, *cis*- γ -Bisabolene only detected in control treatment. Menthone, β -Bisabolene, *epi*- β -Santalene, 1,8-Cineole only detected in plants treated with salt.

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SEED TREATMENTS ON THE TIME OF PREPARATION SEED GERMINATION HENNA (*LAWSONIA INERMIS*)

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One of the important medicinal plants that are grown commercially in the world is Henna. One of the problems limiting the ability Vigor storage and germination is a rapid decrease in Henna. In order to test how different Praiming-hay influence of osmotic agents (distilled water, CaCl₂ 10 mM, NaCl 50 mM, KNO₃ one percent, KCl-four percent of salicylic acid 0 / 5 mM) in Prime Time 5, 10 and 20 on the germination, growth and germination indices, the number of seedlings, rootlet length, length and wet and dry weight seeds were obtained. Time of germination, uniform seedlings, growth rate, percent germination of seeds and stamina were significantly affected by treatments. These treatments can be effective as treatments improve and reduce the electrical conductivity in the grain seed extract and alpha Mylaz-hay called. Key words: Henna, Halopriming, Prime Time, germination

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GROWTH PERFORMANCE OF *SATUREJA SAHENDICAN* ON WATER STRESS CONDITION IN QAZVIN STATE

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Satureja sahendica belong to Lamiaceae family exclusively distributed from Iran [1]. It's an important herbal medicine plant which has been used in food industrial, medicine, cosmetic and healthcare usage. Water stress is an important factor on growth and its impact on optimizing the production of aromatic oils and plant combinations [1, 2]. So the current research was conducted in Agricultural Research Center of Ismail Abad, Qazvin. The study was carried out in a split block design based on randomize complete block design (RCBD) with 3 replications. This was conducted to study the level of water stress on *satureja Sahendica*. The treatments were irrigation in 3 levels including: no water stress (irrigation on field capacity), moderate water stress (irrigation based on second field capacity), and a quarter of the irrigation field capacity (severe water stress) in the main plots and foliar nitrogen (Urea) application levels (0.0, 5.0 and 10.0 hg/h) in 2 time applications in sub-plots. There were no statistical significant mean ($p \geq 5\%$) between irrigation treatments 1 and 2 with highest yield. There was a statistical significant ($p \leq 1\%$) differences between irrigation treatments 3 and the others (Irrigation treatments 1 and 2). Highest yield of *Satureja* was performed in second level of urea fertilizer application with highest statistical significant differences among the treatments.

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EFFECTS OF EXOGENOUS SALICYLIC ACID ON QUALITY AND QUANTITY OF ESSENTIAL OILS IN YARROW (*ACHILLEA MILLEFOLIUM*)

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Achillea millefolium (L.) is generally known as Yarrow, is one of the important medicinal plants and is used in folk and official medicine. The essential oils of *Achillea millefolium* is reported to possess disinfectant properties and has also been used as a haemostatic. Salicylic acid (SA) is an endogenous growth regulator of phenolic nature which participates in the regulation of physiological processes in plant and plays an important role in the defense responses to pathogen attacks and to several abiotic stresses. This study was carried out to determine the effects of exogenous application of SA on quantity and quality of essential oils in *Melissa officinalis* under field conditions in Sadra region west of Shiraz, Iran, for a period of nine months starting September 2009. The effects of different concentrations of exogenous salicylic acid (SA) application (0, 250, 500 and 750 mgL⁻¹) applied in early flowering stage on both quantity and quality of essential oils of *Achillea millefolium* were evaluated. The essential oils were analyzed by GC and GC/MS. Application of SA increased the amounts of beta-caryophyllen and 3-methylcyclohex-2-enone from 0.83% and 0.55% in control to 13.88% and 9.93% in plants treated with 750 mgL⁻¹ SA, respectively. However, the amounts of α -Bisabolene decreased from 8.02 % control to 7.92 % in plants treated with 750 mgL⁻¹ SA. Some compounds such as farnesol, spathulenol and alpha-cadinol were only detected in control plants. The total essential oils were increased from 0.04% in control to 0.08 % by weight in plants treated with 750 mgL⁻¹ SA. These results show that the application of SA at proper concentrations will affect the essential oils of *Melissa officinalis* L plants both quantitatively and qualitatively.

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EFFECTS OF EXOGENOUS SALICYLIC ACID ON QUALITY AND QUANTITY OF ESSENTIAL OILS IN LEMON BALM (*MELISSA OFFICINALIS*)

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Lemon balm (*Melissa officinalis* L.), member of *Lamiaceae* (formerly *Labiatae*) family, is one of the important medicinal plants. The essential oils of *Melissa officinalis* Boiss are used as folk medicines. Salicylic acid (SA) is an endogenous growth regulator of phenolic nature which participates in the regulation of physiological processes in plant and plays an important role in the defense responses to pathogen attacks and to several abiotic stresses. This study was carried out to determine the effects of exogenous application of SA on quantity and quality of essential oils in *Melissa officinalis* under field conditions in Sadra region west of Shiraz, Iran, for a period of nine months starting October 2009. The effects of different concentrations of exogenous salicylic acid (SA) application (0, 250, 500 and 750 mgL⁻¹) applied in early flowering stage on both quantity and quality of essential oils of *Melissa officinalis* were evaluated. The essential oils were analyzed by GC and GC/MS. Application of SA increased the amounts of Thymol and Carvacrol from 17.33% and 6.78% in control to 21.63% and 39.72% in plants treated with 500 mgL⁻¹ SA, respectively. However, the amounts of geraniol decreased from 24.47% control to 3.87% in plants treated with 500 mgL⁻¹ SA. Some compounds such as β -Thujone, Caryophyllenol and Aromadendrene oxide were only detected in control plants. β -Pinene was only detected in plants treated with SA. The total essential oils were increased from 0.05% in control to 0.12% by weight in plants treated with 750 mgL⁻¹ SA. These results show that the application of SA at proper concentrations will affect the essential oils of *Melissa officinalis* L plants both quantitatively and qualitatively.

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THE EFFECT OF ALTITUDE ON *ZIZIPHORA CLINOPODIODES* LAM. ESSENTIAL OIL

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Growth and development of plants in different ecosystems and natural habitat is effected by different environmental factors like altitude. Therefore, the effect of altitude on essential oil of wild thyme (*Ziziphora clinopodioides* Lam.) growing wild in Central Zagros (Dena) was investigated. *Ziziphora clinopodioides* Lam., which is a medicine plant, belongs to *Lamiaceae* family and its essential oil is used for treatment of stomachache, flu, depression, diarrhea etc. The sampling site altitude were ranged from 1749, 2370, 2622 meter. The samples are withdrawn before flowering in Jun 2010. The chemical components of the essential oils were examined by GC and GC/MS. The main components of the oil were Thymol (46.89), Carvacrol (44.62), Linalool (4.72), α -Terpinene (16.36), *cis*-*o*-Oimene (19.23), *Trans*-Caryophyllene (4.81), and Borneol (3.89). There was a negative correlation between essential oils content efficiency and higher altitude. There was negative correlation between percent of Thymol and α -Terpinene and altitude, while there was positive correlation between Carvacrol and Borneol and altitude.

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STUDY THE EFFECT OF PLANTING DATE AND PLANT DENSITY ON TARRAGON YIELD AND YIELD COMPONENTS IN KERMAN-IRAN. (*ARTEMISIA DRACUNCULUS L.*)

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Tarragon (*Artemisia dracunculus L.*) is a perennial herbaceous plant that is widely used in food and medical industries. In order to study the effect of planting date and plant density on Tarragon yield and yield components, this experiment is conducted in Kerman Agriculture Research Center experimental farm, using a RCBD with 4 replications, in 1389-1390 (2010-2011). In this study planting date (March 4, March 14, April 3) and 4 plant density (8, 11, 16 and 33 plant/m²) were compared. Data were compared by MSTATC software, and means were compared by Duncan Test. Measured attributes were: plant height, canopy coverage, wet yield, dry yield, dry leaves yield, dry shoot yield and also essential oil percent. Results showed that planting date had significant effect on all measured attributes. The highest yield (18490.6 Kg/ha) and the least yield (7350.6 Kg/ha) were produced in first and third planting date, respectively. The plant density of 33 plant/m² produced the highest yield of 23265 Kg/ha. Higher yield in first planting date was due to more assimilates and their more effective transportation into vegetative organs. Plant density had significant effect on plant height, economical yield, canopy coverage, dry and wet weight, but had no significant effect on other attributes. Upon this experiment results, the best planting date and plant density are (March 4) and 33 plant/m² respectively.

EFFECTIVENESS ANALYSIS OF A MEDICINAL PLANT GROUP ON SIGNIFICANT PHYSIOLOGICAL FACTORS OF THE ENDURANCE ATHLETE (KAYAKER)

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Herbs have been used throughout history to enhance physical performance but scientific scrutiny with controlled clinical trials has only recently been used to study such effects. The following herbs are currently used to enhance physical performance despite the lack of scientific evidence of effect: Chinese, Korean, and American ginseng; Siberian ginseng, Mahuang Chinese Ephedra; Ashwagandha; Rhodiola; Yohimbe; *Cordyceps* fungus, Shilajit or Mummio; Smilax; wild Oats; Muira Puama; Tribulus Terrestris; saw palmetto berries; β - Sitosterol and other related sterols; and wild yams (Antonio et al. 2000, Bedir and Khan 2000, Brown et al. 2001). According, the main objective of this study project was Survey the selection of medicinal plants on some of physiological factors in endurance of athletes. The research material included 30 competitive (boys) kayaker with average age 18.05 ± 2.3 and body height 170.85 ± 6.45 cm, body mass- 70.3 ± 4.3 kg) divided into 2 groups of 15 subjects each. One group received a supplement called Phyto tonic (include of Ginseng, Ginkgobiloba, fenugreek seed, sour orange peel, Tribulus Terrestris; and Echinacea and Glucose); another group received a placebo containing Lactose and Spinach, which was treated as a control group. The experiment carried out for 4 weeks during which all subjects performed six sessions training weekly and four specific strength workouts. VO₂max (based on Broce protocol) and blood profile Lactate were evaluated before and after the cessation of the experiment. The Spss17 software was used for analyzing the data. In addition, t-student tests were done to compare the groups. The results indicate that the blood lactate levels of the experimental was lower than those of the control group ($P < 0.05$) and Phyto tonic Supplement significantly ($P < 0.05$) improved the VO₂max in the first group. [1, 2]

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EFFECT OF SALINITY STRESS ON GERMINATION, GROWTH PARAMETERS AND ESSENTIAL OIL OF TWO SPICES OF *SATUREJA BACHTIARICA*, *S. KHUZESTANICA*

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In order to study of salinity stress effects on germination, growth parameters and essential oil of two *Satureja* spices, two separate experiments were conducted by six salinity levels applied zero(control), 25, 50, 75, 100 and 125 mM NaCl with four replications. The first stage of experiment in a complete randomized design with four replications in laboratory and secondary stage of experiment was factorial in random complete blocks design that carried out in greenhouse of Agricultural Research and Natural Recourse Center in Chaharmahal and Bakhtiary province of Iran. The rate and percentage germination, radical and coleorhizae length, dry and wet seedling weights were measured in germination stage. Shoot thickness and length, SPAD, dry and fresh weights, N, Na, Cl and Protein contents, yield and essential oil were measured in plant growing stage. The results of both stages showed that salinity stress were decreased significantly all characteristics, except of Na and Cl that increased because of ion toxicity especially in high levels of salinity. So yield and essential oil content in 25 and 50 mM NaCl were higher than control but with increasing the salinity concentrations, the yield and essential oil were decreased. There were significant differences between species in reaction to salinity concentrations. So that *S. bachtiarica* in the seedling stage and *S. khuzestanica* in the whole plant stage showed more tolerant to salinity.

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INVESTIGATION OF NERIUM OLEANDER AQUEOUS LEAF EXTRACT TOXICITY IN SOME HEMATOLOGICAL AND BIOCHEMICAL PARAMETERS IN RABBITS

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Oleander is an ever green plant with leathery leaves and fragrant funnel-shaped flowers that come various colors from pink to red, white, peach and yellow and is one of the well known poisonous plants and contains numerous toxic complexes. Oleandrin and neriine are the most significant compounds of this toxins, which are cardiac glycosides [1,2]. The aim of the study was to observe the effect of oleander aqueous leaf extract on some hematological and biochemical parameters in white New Zealand rabbits. For this purpose animals in treatment group were treated with sub lethal dose of the oleander aqueous leaf extract over 28 days. At the end of the treating period blood samples were collected from all animals and effects of oleander on blood parameters were studied. Analysis of obtained data revealed significant decrease in the packed cell volume and erythrocyte count and the other hand significant increased in the alkaline phosphatase, aspartate and alanine aminotraferease activities were observed in treated rabbits compared control group. As a final point, results were showed that oleander extract has toxico-pathologic effects on both biochemical and hematological indices.

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THE COMPARISON OF TWO DIFFERENT DIGESTION SYSTEMS TO DETECT THE
SOMACLONAL VARIATION IN *DUCROSIA ANETHIFOLIA*

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In order to investigate the somaclonal variation in *Ducrosia Anethifolia*, genomic DNA was extracted from normal and eight abnormal plants regenerated from long-term calli using Dellaporta method with some modifications and AFLP procedure was performed with appropriate modifications. The genomic DNA was double-digested with two different restriction enzyme combinations (*EcoRI/Mse I* and *Bgl II/MseI*). The digested fragments were ligated to adaptors appropriate with restriction sequences and prepare to amplifications. The results revealed that the use of *Bgl II/MseI* for digestion is more suitable than *EcoRI/MseI* combination to detect the differences among regenerated plants under different conditions.

INFLUENCE OF DIETARY PLANT STEROLS AND STANOLS ON MEN SERUM PROSTATE-
SPECIFIC ANTIGEN

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Plant sterols (SE) consumption may reduce cell proliferation as well as risk factors related to prostate cancer. However, whether SE or plant stanol (SA) consumption affects male prostate-specific antigen (PSA) levels, as a surrogate for high risk of prostate cancer, has not been yet established [1]. To compare actions of SE and SA on PSA levels, results of three controlled feeding trials were separately and meta-analyzed [2,3,4]. Participants in these trials were healthy, hypercholesterolemic subjects from the same population. In the first trial (A) subjects participated in a parallel study consuming control or phytostanol-containing phytosterol diet (1.5 g/day) (SAE). Subjects of the second trial (B) participated in a cross-over design and consumed (i) margarine alone (M), (ii) M with 1.84 g/day plant sterol-ester (MSE), or (iii) M with 1.84 g/day plant stanol-ester (MSA). In the third study (C) subjects participated in a randomized cross-over feeding trial and fed (i) butter alone (B), (ii) B with 1.8 g/day SE (BSE), (iii) B with 1.8 g/day SA (BSA), or (iv) B with 1.8 g/day of equal size of SE and SA mixture (BSM). Data of SE- and SA-containing and control of the three trials were pooled and slopes of PSA reduction for SE-, SA-containing and control diets were calculated as PSA % change per g per day. PSA absolute values during each trial were not affected by the diet. However, when percentage changes relative to baseline were compared, significant differences ($p \leq 0.05$) were observed between the diets. During the A, SAE reduced ($p = 0.05$) PSA level (12.5%) compared to control, and a significant ($p = 0.02$) difference was observed between day 0 and day 29 during SAE consumption. During B, although MSE and MSA reduced (9.5 and 6.9%, respectively) PSA level, but the reduction was not significant. PSA percentage change relative to baseline for trial C significantly ($p = 0.05$) reduced by BSE diet (16.2%) compared to the other dietary treatments. PSA slope of subjects given SE-containing diet (-0.35% per g per d) were deeper ($p < 0.05$) than those given SA-containing (-0.03% per g per d) or control (0.03% per g per d) diets. In conclusion, these studies show that consumption of SE-containing diets tend to improve the PSA, whereas SA-containing and control diets have no effect on PSA levels.

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Kish Island



CHEMICAL MODIFICATION OF INSOLUBLE FRACTION OF PERSIAN GUM (MOUNTAIN ALMOND TREE GUM)

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Persian gum, mountain almond tree (*Amygdalus Scoparia*) exudate, is a transparent edible gum which can be found in different forests of Iran (Fars and Azarbayjan Provinces). This gum has and could have many pharmaceutical, food and industrial applications. However, it is not used in a commercial practice in food production. This gum consists of soluble (% 25–30) and insoluble fractions (% 70–75). Therefore, in the present study, with a view to utilize the gum for broader applications, chemical modification of insoluble fraction was carried out using acrylamide in presence of sodium hydroxide under different reaction conditions. Variables studied were pH, concentration of acrylamide, reaction time and temperature. The nitrogen content and total ether content were determined. Based on our findings, the optimum conditions for modification (%N=1.55) were pH (14), concentration of acrylamide (0.098 mol), concentration of insoluble fraction (1 g on the dry basis) at 30 °C for 3 h. Furthermore, the rheological properties of modified insoluble fraction of Persian gum solution showed non-Newtonian and pseudo-plastic behavior as well as relatively high viscosity that it increased by nitrogen content increasing [1-3].

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USING OF GENE ENGINEERING AT INCREASING LEVEL OF VITAMIN E IN PLANTS

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Tocopherol (vitamin E) is a lipophilic antioxidant which is synthesized by all plants and exclusively accumulates in the chloroplast. In this review, we present a summary of the recent approaches to increase tocopherol levels in plants using genetic engineering. *p*-hydroxyphenylpyruvate dioxygenase (HPPD) (EC 1.13.11.27) is a key enzyme in the biosynthesis of tocopherol and it is encoded by MiHPPD. This gene encodes a 432-amino-acid protein and expresses differentially during different stages of ripening. It was revealed that MiHPPD gene is ripening related and rapidly induced by ethylene. The best way to increase tocopherol levels in plants is choosing an excellent promoter to generate transgenic plant. The *nirA* promoter from *Synechococcus* sp. strain PCC 7942, which is repressed by ammonium and induced by nitrite was chosen to drive the expression of *Arabidopsis thaliana p*-hydroxyphenylpyruvate dioxygenase. Expression of this gene under inducing conditions resulted in up to a five folds increase in total tocopherol levels with up to 20% of tocopherols being accumulated as tocotrienols. therefore, that transgenic expression of *Arabidopsis thaliana hpd* (*hpdAt*) under *nirA* promoter control would be an excellent model for developing a controlled *Synechocystis* expression system and to demonstrate tocopherol pathway engineering in *Synechocystis*. The results obtained from this photosynthetic model system can be used for tocopherol metabolic engineering in other organisms.

Therefore, the *nirA* promoter system provides a suitable tool for metabolic engineering in *Synechocystis* [1,2].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



STUDY OF THE EFFECTS OF DIFFERENT DOSES OF *ROSMARINUS OFFICINALIS* ON
MORPHINE WITHDRAWAL SYNDROME IN MICE

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Chronic use of morphine leading to dependency, and discontinuation of the drug causes physical and emotional changes which needs pharmacological intervention. In present study we evaluate the effects of various doses of *Rosmarinus officinalis* extract on morphine withdrawal syndrome in comparison to clonidine as a standard method. Total withdrawal score (TWS) was calculated as base of behavioral sign of naloxone precipitated withdrawal syndrome in 56 adult male mice divided in 7 groups, in 6 groups morphine dependency was induced by chronic injection of morphine for 6 consecutive days. *Rosmarinus officinalis* hydro alcoholic extract administered in doses 100, 200, 400, 800 mg/kg. Clonidine and normal saline used in control groups. Withdrawal syndrome was induced by injection of naloxone. Total withdrawal score was decreased by chronic administration of *Rosmarinus officinalis* and clonidine. This study showed that clonidine (0.5mg/kg i.p.) and *Rosmarinus officinalis* extract in all doses used significantly decreased TWS in comparison with normal saline. And this effect was comparable to clonidine. The data obtained in this study suggest that *Rosmarinus officinalis* hydro alcoholic extract has therapeutic potential in management of opiate withdrawal syndrome and this is comparable to clonidine effect particularly at high doses of plant extract.

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ASSESSMENT OF THE ANALGESIC EFFETC OF HYDROALCOHOLIC EXTRACT OF *THYMUS*
SERPYPILLUM IN WRITHING TEST

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Thymus serpyllum is a traditional herbal medicine widely used as an anti-inflammatory, anti-bacterial, prevention hair stave, anti convulsive and anti- allergic agent. This plant has been used In Iranian folkloric medicine for colic and other digestive disease. In this study antinociceptive mechanisms of *Thymus serpyllum* were examined in writhing test as a model of visceral pain. The antinociceptive mechanisms of *Thymus serpyllum* evaluated by examination of GABAergic, adrenergic, serotonergic effects and opioid receptor antagonists on *Matricaria recutita*-induced antinociception. 72 male mice were randomly grouped into 9 groups; Group (I,II): Control and Positive Control groups; received normal saline and indomethacin (5mg/kg), Groups (III,IV,V): were injected with 50, 100 and 200 mg/kg of hydroalcoholic extract of *Matricaria recutita*, groups (VI,VII,VIII,IX): First, were pretreated with either GABAergic receptor antagonist (bicuculine,2mg/kg), opioid receptor antagonist (naloxone,2mg/kg) adrenergicreceptor antagonist (phentolamine,20mg/kg), serotonergic receptor antagonist (cyproheptadine,4mg/kg) respectively, and then received dominant doses of *Thymus serpyllum* extract(200mg/kg). All injections were performed intraperitonealy (ip). All of the animals were injected with acetic acid 0.6% (10ml/kg) for visceral pain induction, 30 minutes after of each intraperitoneal administration. Antinociceptive activity was expressed as of inhibition of abdominal constriction using the ratio: (control mean-treated mean) ×100/control mean. Results showed that the hydroalcoholic extract of *Thymus serpyllum* in dose dependent manner (50mg/kg, 100mg/kg, and 200mg/kg) induced significant reduction of pain response in comparison with control group (p<0.05). Percentage of inhibition of writhing response exhibited by extract in 50mg/kg, 100mg/kg, and 200mg/kg were 51.22%, 62.21%and 74.21% respectively, while indomethacin inhibited the writhing response by 84%. Also in treatment groups, results showed that groups VI and VII did not show significant modify in pain response in comparison with the sham group, and groups VIII, IX indicate significant reduction in pain response in comparison with the sham group, and were 58.22% and 53.37% respectively. According to the data obtained, it seems that the hydroalcoholic extract of *Thymus serpyllum* can have potential benefits in inhibition of visceral pain and also we conclude that GABAergic and opioid system have important role in this inhibition. Also our findings indicate that adrenergic and serotonergic system not involved in this process.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF SILICON ON IMPROVING SEED GERMINATION CHARACTERISTICS OF *BORAGO OFFICINALIS* L. UNDER SALINITY CONDITION

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Germination and seedling development is very important for early establishment of plants under stress conditions. Salinity is one of the environmental stresses that cause a reduction or delay in germination, high seedling mortality and suppress establishment and growth of plants. Recently, the mitigating role of Si in salt stress has received worldwide attention. Thus, the objective of the present study was to test the effects of exogenous silicon (Si) concentrations (1.5, 2 and 2.5 mM Na₂SiO₃) on germination rate (GR), germination index (GI), vitality index (VI) and seedling growth of *Borago officinalis* L. under 120 mM NaCl during 15-day. Our results indicated that GR, GI and VI were significantly decreased when treated with 120 mM NaCl, but they improve significantly by the addition of different Si concentrations compared to those of salt stress conditions, which suggested that exogenous silicon enhanced borage seeds salinity tolerance. Information from this study provides basic knowledge about germination requirements that can be used for re-establishing projects.

IN VITRO PROPAGATION AND REGENERATION OF GARDEN THYME (*THYMUS VULGARIS* L.)

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Thyme garden is a medicinal, aromatic and ornamental plant from the Lamiaceae family. Due to its antioxidant, antimicrobial and vermifuge properties thyme has been used increasingly in food and pharmaceutical industries. *In vitro* propagation techniques could provide rapid and large scale production of this important medicinal plant. In addition, development of a regeneration protocols is useful for genetic transformation of thyme. In present study, an efficient *in vitro* propagation method and a regeneration protocol for thyme garden were established by using seed, stem and root explants. Just after two days, disinfected thyme seeds were successfully germinated on half strength Murashige and Skoog (MS) medium less than 16 hours light, provided by fluorescent white lights (3000 lux) and 8 h dark photoperiod at 24 °C. In the second stage of experiment, thyme stem and root explants were cultured on MS basal medium supplemented with 6-benzyladenine (BA) and indole-3-butyric acid (IBA) three different combinations (0.2, mg L⁻¹ BA and 0.05, mg L⁻¹ IBA; 0.4 mg L⁻¹ BA and 0.1 mg L⁻¹ IBA; or 1 mg L⁻¹ BA and 0.25 mg L⁻¹ IBA), enriched by 30 g L⁻¹ sucrose and solidified with 6 g L⁻¹ agar. After one week, regeneration was obtained for all stem explants on all three different combinations of BA and IBA, while no regeneration from root explants occurred. The highest shoot regeneration and shoot proliferation rate were obtained on medium containing 1 mg L⁻¹ BA and 0.25 mg L⁻¹ IBA.

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EFFECTS OF DROUGHT STRESS ON THE MORPHOLOGICAL CHARACTERISTICS AND DIFFERENT YIELD OF PURPLE BASIL (*OCIMUM BASILICUM* VAR. PURPLE)

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To investigate the effect of drought stress on some morphological and yield of three populations of Purple Basil (*Ocimum basilicum* var. purple), an experiment was performed in the Alborz Karaj research station, in 2011, as a split plot randomized complete block design with three replications. Main factors include population from Karaj, Isfahan and Shushtar, sub-factor were different levels of drought stress include 90%, 60%, 30% field capacity, which those applied during the period of plant growth (from the seedling to the seed loss). Analysis of variance showed that there was significant difference between population's on shoot length, root length and diameter at 5% level and inflorescence at 1%. Variance at different levels of drought stress was significant difference on morphological characteristics and yield at 5% level. Mean comparison populations showed that highest inflorescence yield belong to Esfahan (2.66 ton/ha) and lowest in Karaj population (1.6 ton/ha). Mean comparison of between drought stress showed that the highest inflorescence (2.84 ton/ha) was related to 90% FC and the lowest inflorescence yield (1.44 ton/ha) was related to 30% FC. According to the results, the highest performance and superior morphological characteristics of the treated population was Shushtar * 90% of field capacity.

ANTIOXIDANT AND ANTIMICROBIAL ACTIVITY OF ETHANOLIC EXTRACT OF PISTACIA KHINJUK (ANACARDIACEAE)

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Pistacia is a genus of flowering plants in the cashew family, Anacardiaceae. It contains ten species that are native to the Canary Islands, northwest Africa, southern Europe, central and western Asia, and North America (Mexico, Texas). They are shrubs and small trees growing to 5–15 m tall. *Pistacia* species were reported to have various biological activities such as anti-atherogenic, hypoglycemic, antioxidant, anti-inflammatory and anti-insect activities. In this study, we aimed to investigate the antimicrobial, antifungal and antioxidant properties of *P. khinjuk*.

The ethanolic extract of the plant was obtained by maceration method. The dried extract was suspended in water and four extracts (petroleum ether; dichloromethane; *n*-butanol and final water) were obtained.

The disc diffusion method was used for the determination of the antibacterial activity. Minimum inhibitory concentration (MIC) was evaluated by the macro dilution test method.

The total phenolic content and the antioxidant activity of plant extracts were determined by Folin-Ciocalteu and the 2, 2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging assays, respectively.

All the extracts were active against Gram-positive and gram-negative bacteria especially *n*-butanolic fraction, which showed MIC=1 µg/mL. Ethanolic extract of *P. khinjuk* was showed a powerful antioxidant activity in DPPH Radical scavenging method. Total phenolic contents of the tested plants showed good correlations with the results of FRAP. This means that phenolic compounds provide the major contribution to the antioxidant activity of the plant extracts.

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National Congress on Medicinal Plants
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MEDICINAL PLANTS AND DRUGS FROM ANCIENT PERSIA

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Medicine is one of the oldest sciences in the world. Plants were very good available and accessible materials for medical uses. Therefore, people experimented those and also other available materials for medical approaches and created the science of pharmacy throughout the history. Pharmacy and medicine had a great situation in ancient Persia as old and global civilization (from prehistoric times to 637 A.D when Islam entranced to Iran) [1,2] even before the Greece, for e.g. Pharmacists who were called *urvarō baēšaza* in Avestan language were one of the main groups of physicians (1000 B.C) [3] or herbal medicines were one of the 11 main groups of plants in ancient Persia [4]. In this study, medicinal plants and formulations are considered, and classified (based on ancient manuscripts such as Vandidad, Vazidegiha Zadesparam, Bondahesh, Dinkard, Greece and Roman manuscripts and etc) in the various therapeutic groups such as antiseptics, analgesics, sedatives, antidepressants, air purifiers, oils, cosmetic formulations, poisons, antidotes, balms, abortants and etc. Also, those are identified and the scientific names, common and ancient names (Pahlavic and Avestan) are investigated in this study. Then, their usages were compared by current researches to evaluate ancient persian knowledge about medicinal plants. These results can show progress of herbal medicines and drugs throughout the history and Persians role in it. It seems that medicinal usage of most of herbal and non herbal medicines which were used in ancient Persia are true and can be proved by current researches; and others can be good candidates for further investigations.

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EFFECTS OF PGRS ON CALLUS INDUCTION IN *TRIBULUS TERRESTRIS* L., AN IMPORTANT MEDICINAL PLANT

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The World Health Organization has estimated that more than 80% of the World's population in developing countries depends primarily on herbal medicine for basic healthcare needs [1]. *Tribulus terrestris* L. (Zygophyllaceae) is a plant native of Mediterranean region, but now widely distributed in warm regions of Europe, Asia, America, Africa and Australia [2]. This plant is extremely rich in substances having potential biological significance, including alkaloids, saponin, flavonoids, phytosteroids, and other nutrient [3]. Seed dormancy and low germination rate in *T. terrestris* make this plant as a perfect candidate for developing an *in vitro* regeneration method. Explants such as epicotyl, hypocotyl and leaf were used from 2 weeks old plants that grown in greenhouse. They were surface-disinfected with mercuric chloride and following rinses with sterilized water. The explants were cultured on MS (Murashige and Skoog, 1962) medium supplemented with different concentrations and combinations of auxin (NAA) and cytokinin (BAP) [4]. The results were indicated that the mean of callus induction was influenced by explant type and various phytohormones levels. The highest percentage of callus production occurred on MS medium containing 0.1 mg/L NAA and 1 mg/L BAP from epicotyls explants (91.6%), 0.4 mg/L NAA + 2 mg/L BAP from hypocotyls explant (94.3%), and 0.4 mg/L NAA + 0.5 mg/L BAP for leaf explant (100%). Tissue culture systems for a number of medicinal plants have been established, and this enables the analysis of callus and cell suspension for the presence of varieties of secondary metabolites [5, 6].

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STUDIES ON ETHNO- BOTANY OF MEDICINAL PLANTS IN SOUTH KERMAN REGION

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Usage of medicinal plants in the oldest human treatment for thousands of years. Ancient people achieve medicinal plants properties throughout their experience, observation and examination. That was cased profit by several forms of medicinal plants by human in the several years ago. Nowadays because of some adverse effects of drugs, usage of traditional medicine in more tended the past. Climate variation in Iran has been caused a high variation in vegetation. Collection and identification of medicinal plants will help improvement of non chemical pharmacy and can easily lead to environmental protection. Medicinal plants in south Kerman province were studied by a surveying method. Sampling was done 64 locations. After collecting, the plants were transferred to laboratory and identification was done by library and herbaria studies. Plants were studied about medical organs. Based on results of the present research, 70 species of herbal plants were recognized in this region such as: *Alhaji pseudoalhagi* with anti diarrhea effect, *Anethum graveolens* with Gastric pain and abdominal cramps (in children) effect, *Blepharis persica* with Wound healing effect and *Cerasus mahaleb* with Used in liver and renal problems.

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**REVIEW ANTIBACTERIAL EFFECTS OF METHANOL EXTRACTS OF PLANT DRUGS,
EUCALYPTUS GLOBULUS AND QUERCUS CASTANEIFOLIA ON BACTERIUM LACTOCOCCUS
GARVIEAE IN INVITRO CONDITION.**

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The bacterium *Lactococcus garvieae* is one of the most species of *Lactococcus* sexes that has caused irreparable damages to the rainbow trout breeding industry in Iran.

In this study, bacterium *L. garvieae* that already had been extracted from rainbow breeding farms in Charmahal o bakhtiari state and verified by PCR method in laboratory were used. Also, in this study, the used extracts were the methanol extracts of *Eucalyptus globulus* and *Quercus castaneifolia* plant. The antibacterial effects of methanol extracts were studied by disk diffusion and serial dilution methods in 1.25, 2.5, 5, 10 and 20 concentrations and 3 repeated for each concentration per plant in order to determine disc diffusion, MIC and MBC of each plant extract was located.

Minimum growth inhibition concentration (MIC) was related to *Eucalyptus globulus* 10 mg/ml And medicinal plant Maso 20 mg/ml, while the minimum bacterial concentration (MBC) in *Eucalyptus* plant is 20 mg/ml concentration. Maximum halo diameter of bacterial growth inhibition in studied groups has been 30 mm and in concentration of ethanol extract of *Eucalyptus* 20 mg/ml.

Based on the results of this study, the effects of both studied extracts in halo diameter of bacteria growth inhibition, MIC and MBC have statistically significant difference with the effect of erythromycin antibiotic. The results obtained from the above research can be said with more study on active ingredients in the two mentioned extracts which have powerful antibacterial effects can reveal the way to the attainment of new compounds to treat disease is caused *Lactococcus garvae* bacteria.

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Kish Island



EFFECT OF WASHING, GIBBERELIC ACID AND PRECHILLING ON SEED GERMINATION
AND DORMANCY OF CHAVILL (*Ferulago angulata* L. KOOHGOL ECOTYPE)

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Chavill (*Ferulago angulata* L.) is a medical herb that has antiseptic properties and is also used in the treatment of gastrointestinal diseases. The objective of the present study was to investigate effective methods in breaking the seed dormancy for Chavill (*Ferulago angulata* L.) in Koohgol ecotype. An experiment was conducted to evaluate seed germination of Chavill under different levels of seed washing, gibberellic acid application and prechilling periods (0, 4, 8 and 10 weeks) in completely randomized design with three replications that germinated at the Seed Technology Laboratory of Yasouj University, Iran, in 2011. The result showed that all germination and seedling growth characteristics had affected significantly by interactions of three methods of breaking the seed dormancy, except the shoot length. The most effective and practical method for breaking the seed dormancy was prechilling at least in 4-8 weeks with out gibberellic acid that this method is approach with local environment conditions or ecological needs that plant is grown there. Washing and no washing treatments did not have any significant effect in that condition for germination traits. The germination percentage and rate were higher with application of this method but seed germinated slowly at first. However in seedling growth characteristics best result was achieved by seed washing and prechilling in 4 weeks with out gibberellic acid. Generally, long time of prechilling is the most important factor for germination and growth of this plant [1-3].

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EFFECT OF METHANOLIC EXTRACT OF *MELIA AZEDARACH* ON LIFE STAGES OF
GREENHOUSE WHITEFLY *TRIALEURODES VAPORARIORUM* (WESTWOOD)
(HOMOPTERA: ALEYRODIDAE)

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The greenhouse whitefly, *Trialeurodes vaporariorum* is one of the most serious pests of vegetables in the world. Whiteflies damage the plants through direct sap feeding [1], honeydew excretion and transmission some plant pathogenic viruses [2]. Chemical control of *T. vaporariorum* is difficult because synthetic insecticides have been widely developed and their extensive use has brought about disadvantages, like environmental disturbance, pest resistance, outbreaks of population, lethal effects on non target organisms and toxicity to users and consumers. The current insecticides mainly were caused resistance to insects and outbreaks of whiteflies. The plant kingdom is by far the most efficient producer of chemical compounds, synthesizing many products that are used in defense against herbivores. The destructive effect pesticide on the human and environment provide more botanical compound for pest control alternative to pesticide as a rich source of bioactive chemicals [3].

The effects of *Melia azedarach* on different life stages of the whitefly *T. vaporariorum* were tested in laboratory. The leaf discs of bean plants with eggs (7 days old), maximal amount of nymphs (ca. 90%) as well as new pupa of the whitefly individually were placed in the round plastic Petri dishes (5cm diameter) that filled with agar gel. In different set of experiment, the leaves were sprayed with methanolic extract of *M. azedarach* (80 mg/ml). Likewise, in control treatments, distilled water was used. Among the treatments, the result showed that the plant extract did not affect on hatching time of eggs ($P < 0.05$). However, the mortality of eggs was significantly increased after treatment with the plant extract (30.8%). The mortality of nymphal instars of the whitefly was significantly different than control treatments ($P < 0.005$). This extract was the most effect on nymphal instars of whitefly (85.0%). The percentage of pupa mortality of the whitefly was significant higher than control treatments (77.7%) ($P < 0.005$). So, the insecticidal potential of *M. azedarach* extract could be reduced to population of the whiteflies and affected on mortality of this insect.

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Kish Island



TOTAL POLYPHENOL AND HYPERICIN AMOUNT OF ST. JOHN'S WORT (*HYPERICUM PERFORATUM* L.) RELATED TO MISHO REGION OF EAST-AZARBAYEJAN

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Hypericum perforatum L. has important valuable medicinal complexes such as polyphenol and hypericin [1,2]. In this study we used one landrace aggregate of this flower related to Misho region of East-Azərbayejan. Samples that obtain from plant head-branch were used to produce air member in base environment (MS), include 0.5 mgr l⁻¹ BAP, and were assessed for total polyphenol and hypericin amount. Total polyphenol complexes amount in methanolic extract of landrace aggregate of *Hypericum perforatum* L. of misho region about 1084.45 ± 3.73 mg of gallic acid equiv/g and amount of total hypericin 1056.56 ± 162.14 µgr gr⁻¹ was assessment. Results show that landrace aggregate related to Misho region is adequate for medicinal effective materials and we can use this landrace aggregate in breeding programs.

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EXOGENOUS SALICYLIC ACID IMPROVES ANTIOXIDANT DEFENSE SYSTEM AND ALLEVIATES EFFECTS OF DROUGHT IN *MELISSA OFFICINALIS*

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The paper reports the effects of salicylic acid (SA) on some physiological characteristics of *Melissa officinalis* L. plants grown in pots under water stress. The treatments of water stress consisted: control, 100% field capacity (FC) and drought, 50% FC [1, 4]. Some antioxidant enzyme activities (superoxide dismutase SOD, catalase CAT, peroxidase POD and ascorbate peroxidase APX), reactive oxygen species (hydrogen peroxide H₂O₂) and lipid peroxidation were determined during the drought period [2,3]. A remarkable reduction in dry weight of water-stressed plants was associated with significant decrease in stomatal conductance (g_s) and net CO₂ assimilation rate (A). Foliar application at 10 µmol SA increased significantly net CO₂ assimilation rate, shoot dry weight and relative water content (RWC) in well-watered plants. The results showed that application of SA improved the water status of drought stressed plants. Activity of antioxidant enzymes were increased by drought stress significantly. Compared with the non-SA treatment, application of SA increased the activities of some antioxidant enzymes: SOD and CAT, whereas the content of hydrogen peroxide was decreased by applying SA compared with those of non-SA treatments under drought. The activities of POD and APX showed no significant difference between SA treatment and non-SA treatment under water deficit conditions. In addition, the amounts of malondialdehyde (MDA) remained unchanged in SA-supplemented water-deficit plants. These results indicate that an application of SA was favorable for biomass accumulation of *M. officinalis* plants under well-watered conditions. However, it did not significantly affect on dry matter accumulation under drought stress, but SA-supplemented water-deficit plants exhibited better protection from oxidative damage because of higher CAT and SOD activities and lower level of lipid peroxidation. These results suggest that SA spraying can improve antioxidant defense system under drought stress conditions, and it may be recommended for arid and semiarid regions.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF THE PHYSICAL AND CHEMICAL PROPERTIES OF SOIL ON THE PERFORMANCE AND THE AMOUNTS OF COMPOSITIONS IN THE ESSENTIALS OF *TANACETUM POLYCEPHALUM SCHULTZ-BIP.POLYCEPHALUM* IN THREE SITES OF MAZANDARAN PROVINCE

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Herbs grow in different ecosystems and sites under the influence of various factors such as climate and the soil of a typical area that are both seen as the decisive factors determining the quantity and quality of the herbs. Since the soil nutrients have effect on the growing and productive aspects of the herbs to grow, they will normally be able to change the performance of the products and therefore affect the quantity and quality of their substances. One of the valuable herbal species that grow in the mountainous highlands is the herb called *Tanacetum polycephalum*, which is a *Tanacetum* type and belongs to *Compositae* and which is an aromatic perennial. The purpose of the study is to investigate the compositions of essentials in the aerial parts of *Tanacetum polycephalum* in time of flowering which has been influenced by the physical and chemical properties of soil in three growth areas of Mazandaran province (i.e. Behshahr, Savadkouh, and Baladeh). In this research, the essential was extracted through water distillation from the aerial parts of the herb in the flowering stage and in three herbal sites, and their compositions were identified using the Gas Chromatograph (GC) and the Gas Chromatograph attached to the Mass Spectrometer (GC/MS). The variances of the data were analyzed using the Statistical SPSS Software. Then, the means of treatments were compared using the Duncan test, and the correlations between the chemical elements and the essential outputs as well as the herbae substances of the *Tanacetum polycephalum* were measured in three sites using Pearson Correlation Coefficient in the SPSS software. The results indicated that the essential outputs obtained in different sites (i.e. Behshahr, Savadkouh, and Baladeh) were 0.75%, 1.08% and 1.4%, respectively. Also, there was a statistically positive and significant correlation between the increase in nitrogen and the 1,8-Cineole and Terpinene-4-ol compositions and between the increase in sodium and the Beta-pinene composition in different sites. An in-depth look at the results reveals that the percentage of the essential output and the amount of compositions in the *Tanacetum polycephalum* are heavily dependent upon the the environmental conditions (i.e. climate and soil), and the amounts vary in three areas.

INVESTIGATING THE EFFECT OF PHYSICAL AND CHEMICAL PROPERTIES OF SOIL ON THE PERFORMANCE AND THE AMOUNTS OF COMPOSITIONS IN THE ESSENTIALS OF *STACHYS LAVANDULIFOLIA. VAHL* IN THREE SITES OF MAZANDARAN PROVINCE

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Herbal plants grow in a variety of ecosystems and natural sites under the influence of different factors such as type, climate and soil. So that the physical and chemical properties of soil and its Low consumption and high consumption nutrients are the foremost factors, and, thanks to their effect on the growth and production of the herbs, they will normally induce changes in the performance of the products and the quantity and quality of substances in them as well. Therefore, it is essential to identify the factors affecting the quantity and quality of the herbs and to establish the greater effectiveness of the substance quality, especially in time of harvest, so as to make use of the potentiality of the soil organisms and organics to achieve the greatest amounts of products as well as enhance the soil quality and retain the soil integrity, and hence protect the environment. *Stachys lavandulifolia* is a *Stachys* and belongs to the Labiatea and grows stacked high at low levels in the altitudes of 1900-3300 m. The purpose of the study is to investigate the changes in amounts of the essential in the aerial parts of the *Stachys lavandulifolia* in the flowering stage that have been affected by the physical and chemical properties of the soil in three areas of Mazandaran province (i.e. Behshahr, Savadkouh, and Baladeh). In this study, the essential was extracted through water distillation from the aerial parts of the *Stachys lavandulifolia* in the flowering stage and in three herbal sites. The GC and GC/MS instruments were used to identify the essential compositions. The relative percentage of individual compositions was calculated by using GC spectrum regarding Peak area of every composition. The variances of the data were analyzed using the Statistical SPSS Software, and the means of treatments were compared using the Duncan test, and the correlations between the chemical elements and the essential outputs as well as the herbal substances of the *Stachys lavandulifolia* were measured in three sites using Pearson Correlation Coefficient in the SPSS. Statistical analyses indicated that the essential outputs obtained in the sites of Behshahr, Savadkouh and Baladeh were 0.48%, 0.50%, and 0.63%, respectively. Likewise, there was a statistically positive and significant correlation between the increase in the acidity of the soil and the *Bicyclogermacrene* composition, while there was a statistically negative and significant correlation between the increase in potassium, nitrogen, organic substances, organic carbon, and magnesium and the β -Myrcene and α -Cadinol compositions at $p < 0.05$. An in-depth look into the obtained results reveals that the difference in the percentage of the essential outputs and the amounts of the compositions in the given herb arises from different effects of climate and soil.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



VARIATION OF ESSENTIAL OIL OF *TEUCRIUM POLIUM* L. DIFFERENT GROWTH STAGES

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The essential oils from the aerial parts of *Teucrium polium* (Lamiaceae), collected in vegetative, flowering and fruit stage, were obtained by hydro-distillation. The chemical components of the essential oils were examined by GC and GC/MS. Twenty-nine components were detected in vegetative stage with α -Pinene (15.3%), trans-Caryophyllene (12.6%), 7-epi- α -Eudesmol (12.3%), β -Pinene (6.6%), α -Eudesmol (6.6%), β -Myrcene (5.9%), Caryophyllene oxide (5.6%) and limonene (5.4%) as the major components. Twenty-seven components of essential oil in flowering stage were introduced which α -Pinene (30.7%), β -Pinene (11.9%), β -Myrcene (8.9%), Limonene (7.9%), Germacrene-D (6.9%), trans-Caryophyllene (5.6%) and Bicyclogermacrene (4.6%) as the major constituents. In the fruit stage oil 30 components were identified that included trans-Caryophyllene (12.1%), Germacrene-D (11.8%), α -Eudesmol (11.1%), 7-epi- α -Eudesmol (7.7%), Spathulenol (4.8%), Caryophyllene oxide (4.2%) and Limonene (4.1%) as the main constituents.

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COMPARATIV CHEMICAL CONSTITUENTS OF ESSENTIAL OIL AND ANTIOXIDANT
ACTIVITY OF METHANOLIC EXTRACTS THE *SALVIA MACROSIPHON*
(WILD AND DOMESTIC TYPE) BY FRAP AND DPPH ASSAY

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Medicinal plants (especially belong to Lamiaceae family) are potential sources of new drugs to improve the treatment of diseases whose treatment is associated to anti-oxidative agents. Methanolic extracts of *salvia macrosiphon* (wild and domestic) growing in Iran (fars province) were investigated for their antioxidant activity by DPPH and FRAP assay. IC₅₀ for antioxidant activity for *S. macrosiphon* domestic 1426.52 and wild 2743.05 μ g/ml (by DPPH) and inhibition percent domestic 69 and wild 22.84 μ g/ml (by FRAP) and Total phenolic content domestic 44.92 and wild 21.74 mg gallic acid equivalent/g of extracts. The main components of the oil wild type were Linalool (40.45%) and Hexyl isovalerate and of the oil domestic type were Linalool (24.83%) and Sclaren (14.4%).

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



RHIZOPUSSTOLONIFER IMPROVES LIGNAN PRODUCTION IN *LINUM ALBUM* CELL CULTURE BY INCREASING THE EXPRESSION OF GENES RELATED WITH ITS BIOSYNTHESIS

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Lignans constitute a large group of secondary metabolites synthesized by some plants, and show high biological activities. *Linum album*, one of endemic species in Iran, has podophyllotoxin and other lignans. Podophyllotoxin (PTOX) is a lignan compound which occurs in a few plant species and has pharmacological significance for its anticancer activities. It is used as a precursor for the chemical synthesis of the anticancer drugs etoposide, teniposide and etopophose. Since the chemical synthesis of podophyllotoxin is an expensive process, production of PTOX using cell culture of *linum* species is a cost-effective alternative approach. Various strategies have been employed to increase the production of secondary metabolites in cell culture. Fungal elicitors can be used for triggering of secondary metabolite synthesis in cell culture. In this study, we have verified the time-course of lignan synthesis and expression of phenylalanine ammonio-lyase (*PAL*), cinnamoyl-CoA reductase (*CCR*) and cinnamyl alcohol dehydrogenase (*CAD*) genes and *PLR*, key gene in biosynthetic pathway of PTOX in *L. album* cell cultures. Treatment of *Linum album* cell cultures with *Rhizopusstolonifer* increased the production of PTOX and lariciresinol 3-fold and 8-fold higher than control, respectively. Quantitative real-time PCR analysis indicated that the expression of *PAL*, *CCR* and *CAD* and *PLR* genes were significantly increased, reaching a peak at 3 days after treatment. These changes in genes expression were correlated with increased lignan production.

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INFLUENCE OF BIOFERTILIZERS ON SOME MORPHOLOGICAL TRAITS, FLOWER YIELD AND ESSENTIAL OIL PERCENTAGE OF CHAMOMILE IN DIFFERENT HARVESTING TIMES

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It is well known that intensive cultivation has led to a rapid decline in organic matter and nutrient levels besides affecting the physical properties of soil [1]. The beneficial effects of vermicompost have been observed in horticultural [2] and agronomic crops [3]. According to several studies, the foliar application of amino acids causes an enhancement in plant growth and fruit yield while the maintenance of protein component [4].

In order to study the effects of vermicompost and amino acids application on flower yield of chamomile (*Matricaria chamomilla* L.) in three harvesting times, an experiment was carried out in the Alborz Medicinal Plant Research Station at Karaj region. The experiment design was factorial based on randomized complete blocks design with three replications. Treatments were consist of vermicompost in 5 levels (0, 5, 10, 15 and 20 ton/ha) and amino acid spraying in 3 levels (at budding stag, at full flowering stage, at budding stag + at full flowering stage). There were three harvesting times. Results of this investigation showed that days to flowering affected by vermicompost, significantly. The highest plant height (41.8 cm), fresh flower yield (3335.7 kg/ha) and dried flower yield (653.8 kg/ha) were obtained by using 20 tons vermicompost per hectare. Maximum yield were obtained by amino acid spraying at 2 times (at budding stag + at flowering stage). Harvesting time have a significant effects of qualitative characters of chamomile flowers [5]. In this study, at the second harvesting time, flowers had more essential oil and chamazulene content, which it is accordance to other findings [888]. Amino acid spraying at budding stag + at full flowering stage caused more flower yield and essential oil content.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF AQUEOUS ROOT EXTRACT OF BERBERIS VULGARIS L. ON SERUM GLUCOSE IN DIABETIC RATS

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Diabetes mellitus is a heterogeneous metabolic disorder old as mankind and its incidence considered to be high (4-5%) all over world [1]. The use of medicinal plants for the treatment of diabetes mellitus dates back from the Ebers papyrus of about 1550 B.C. A multitude of herbs spices and other plant materials have been described for the treatment of diabetes throughout the world [2]. Berberis vulgaris (Berberidaceae) is one of the plants has a long history in traditional medicine [3]. In the present study, the effects of aqueous root extract of *Berberis vulgaris* L. (AREBV) on blood glucose and body weights of the non-diabetic and streptozocin induced diabetic rat were investigated.

Twenty-four adult male Wistar strain rats (180-220g) were divided randomly into three groups (experimental, diabetic and non diabetic controls), and housed in single cages. Diabetes was induced with injection of Streptozocine (60 mg/kg, i.p.) [4] And the control group was given an injection of normal saline. The experimental group received aqueous root extract of *Berberis vulgaris* L. (500 mg/kg bw) intra gastric for 4 weeks. Fasting blood glucose level (after fasting for 12 hours) of each rat was measured by using a glucometer through taking a blood drop following cutting the tip of the tail, before streptozocin injection and after 1, 2,3, and 4 weeks of streptozocin injection and at the same time the animals were weighed. The blood glucose levels and weights of non-diabetic rats were measured in the same way as diabetic rats.

Aqueous root extract of *Berberis vulgaris* L. after 3 and 4 weeks of administration significantly lowered blood glucose level of diabetic rats ($P<0.05$) but increased their weight as compared with control diabetic rats ($P<0.05$). While after 3 and 4 weeks of streptozocin injection, the weights of the control diabetic group decreased as compared to the control non-diabetic group.

Administration of aqueous root extract of *Berberis vulgaris* L (AREBV) diminished the weight loss of animals with STZ induced diabetes (STZ-groups) more significantly. Also, a marked hypoglycemic effect was seen in AREBV-treated rats.

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MICROPROPAGATION AND CALLUS INDUCTION OF SALVIA (*SALVIA MACROCIPHON* BOISS)

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Several species in *Salvia* genus have been used in traditional medicine as well as in pharmaceutical industry for their antioxidant, antimicrobial and anti-inflammatory properties [1]. Plant tissue culture techniques are proved to be useful for rapid mass production of medicinal plants in controlled environments. In this study, the effect of plant growth regulator treatments and different explants (leaf, shoot tip, stem and root) on micropropagation and callus induction of salvia (*Salvia macrociphon*) was investigated. Salvia seed were sterilized and transferred on Murashige and Skoog (MS) medium without any plant growth regulators under 16 hours light, and 8 h dark photoperiod at 24 °C. After two weeks, explants were prepared from 5 Cm height *in vitro* seedlings. Leaf, shoot tip, stem and root explants were cultured on MS basal medium supplemented with 0.3, mg L⁻¹ indole-3-butyric acid (IBA)[2] in combination with three different concentrations (0.3, 0.45, 0.6 mg L⁻¹) of 6-benzyladenine (BA). The results showed that shoot tip and stem explants were useful for micropropagation of *Salvia macrociphon*. Among different plant growth regulator levels and various explants used in this experiment, the best callus induction was observed with stem explants on medium supplemented with 0.3, mg L⁻¹ IBA and 0.6 mg L⁻¹ BA.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



INCREASING LIGNAN PRODUCTION IN *LINUM ALBUM* CELL CULTURE BY NITROGEN SOURCE

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The natural lignin podophyllotoxin (PTOX), a dimerized product of two phenylpropanoid moieties which occurs in a few plant species, is a pharmacologically important compound for its anticancer activities. It is used as a precursor for the chemical synthesis of the anticancer drugs etoposide, teniposide and etopophos. Since the chemical synthesis of PTOX is an expensive process and its availability from natural sources is an important issue for pharmaceutical companies, the biotechnological production of PTOX using plant cell and tissue cultures assumes great significance. Manipulation of nutritional factors is very effective in enhancing the yield and productivity of plant cell suspension culture. Among nutrients, nitrogen source in the medium was demonstrated not only significantly affects the growth and development of plants, but it also changes secondary metabolism. In this study, we investigated the different concentrations effect of total nitrogen on cell growth, PTOX and lariciresinol production in *L. album* cell culture. Treatment of *L. album* cell cultures with the 60mM total nitrogen increased the production of PTOX and lariciresinol about 2-fold higher than control.

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SALICYLIC ACID-INDUCED PHYSIOLOGICAL EFFECTS AND TAXOL PRODUCTION IN CELL CULTURES OF *TAXUS BACCATA* L.

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Numerous strategies have been proposed for improving plant cell productivity and secondary metabolite production in suspension-cultured cells. Elicitation is one of them, which efficiently activates the expression of defense-related genes and also the pathways of defense-related secondary metabolites (Zhao et al., 2005). Salicylic acid (SA) is considered one of the key endogenous signals involved in regulating a number of processes in plants and vigorously stimulates secondary metabolism. The present study was undertaken in order to investigate the effect of different concentrations of SA (25, 50 and 50 mg/L) on some physiological parameters and taxol production in cell culture of *Taxus baccata*. Calli were induced from longitudinally-halved stem sections of *T. baccata* on solidified B5 medium, supplemented with α -naphthalene acetic acid (2 mg/l), 2,4-dichlorophenoxyacetic acid (0.2 mg/l), benzyladenine (0.2 mg/l), sucrose (20 g/l) ascorbic acid (50 mg/l) and pH 5.5 for about 20-30 days. Cell suspensions were established from the friable calli in the same media without agar. The results showed that growth, viability and protein content of cells were decreased when SA concentration increased. The lipid peroxidation rate, phenolics content and activity of phenylalanine ammonia-lyase, polyphenol oxidase and peroxidase enzymes gradually increased with increase of SA concentration up to 50 mg/L, but at higher concentration decreased significantly. Increase in SA concentration resulted in more taxol biosynthesis and production and most yield of taxol (3.2 mg/g DW) was obtained at 50 mg/L of SA which enhanced about 6.6-fold compared to that of the control. The induction of cell defense responses by SA elicitor is probably one of reasons for improving biosynthesis and production of taxol.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ANTIMICROBIAL SCREENING OF FENNEL AT THE SEEDLING STAGE

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Nature has been a source of medicinal agents for thousand of years and an impressive number of modern drugs have been isolated from natural sources, notably from plant origin [1, 2]. The ethanolic extract obtained from aerial parts of fennel (*Foeniculum vulgare* Mill.) seedlings was evaluated *in vitro* to examine their antimicrobial activity against four Gram-negative and three Gram-positive bacteria and two fungal samples. The microorganisms *Staphylococcus aureus*, *Escherichia coli*, *Salmonella typhi*, *Pseudomonas aeruginosa*, *Bacillus subtilis*, *Klebsiella pneumonia*, *Aspergillus niger*, *Candida albicans* and *Staphylococcus epidermidis* were used. Fennel seedling extract had no inhibitory effect against experimented gram-positive bacteria and fungal samples, but had a weak effect against experimented gram-negative bacteria.

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STUDY OF *IN VITRO* ANTIMICROBIAL ACTIVITY OF THREE MEDICINAL PLANTS

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Some plants can produce different chemicals with *in vitro* antimicrobial activity. Bacteria have the genetic ability to transmit and acquire resistance to anti-bacterial drugs [1]. According to world health organization (WHO), medicinal plants would be the best source to obtain a variety of drugs [2, 3]. The antimicrobial activity of plant extracts have evaluated with antibiotic susceptible and resistant microorganisms. In the present study, Iranian strains of *Xanthomonas campestris*, *Pseudomonas putida*, *Pseudomonas aeruginosa*, *Proteus mirabilis*, *Bacillus subtilis* and *Staphylococcus aureus* were used. Extract from *Ferula assa-foetida*, *Ricinus communis* and *Foeniculum vulgare* were utilized. The disc diffusion method was used to determine the growth inhibition of bacteria by plant extracts and micro-broth dilution method for determination of minimum inhibitory concentrations. Stock solutions (100 mg/ml) of plant extracts were prepared in suitable solvents (Ethanol and water) and filtered using 0.2 µm sterile filters. Gentamicin and Penicillin were used as positive control for gram negative and gram positive bacteria, respectively. The plant extracts showed anti-bacterial activity. The highest and lowest antimicrobial activity was observed for *F. assa-foetida* and *F. vulgare*, respectively. Inhibitory zone of the extracts were from 10.2 to 20 mm, and the minimum inhibitory concentrations of the extracts were 5 to 80 mg/ml. The extracts showed different activity and were found to be active against gram-positive as well as gram-negative bacteria. In addition, changes of DNA pattern affected by the plant extracts using random amplification of polymorphic DNA were studied. The results suggest that the *F. assa-foetida* is a good antibacterial plant.

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EFFECT OF SOME BIO AND CHEMICAL FERTILIZERS ON SEED YIELD AND SOME SEED YIELD COMPONENTS OF DILL (*ANETHUM GRAVEOLENSE L.*)

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Currently, medicinal plants are of considerable interest in Iran. Dill (*Anethum graveolense L.*; Fam. Umbelliferae) is one of the most important medicinal and aromatic plants due to its estrogenic activities and uses as a carminative, diuretic, anti-inflammatory, antimicrobial, and galactogogue; it is a substance which is used to increase the production of milk in humans and other animals. Also, it is given to infants in the treatment of flatulence. In addition, the volatile oils of dill are used to control flatulent dyspepsia and colic in children [1]. In order to study the effect of some bio and chemical fertilizers on seed yield and some yield components of dill (*Anethum graveolense L.*) an experiment was performed at the Research Station of Faculty of Agriculture, Islamic Azad University of Tabriz, Iran in 2010. The pots experiment was conducted as factorial design based on completely randomized design with three replications. The factors that were studied in this research consisted of dill landrace populations of Mobarakeh Esfahan and Hamadan, mycorrhiza including *Glomus interadices* and *Glomus Mosseae*, biofertilizers of nitrogen-fixing including nitroxin and Super nitro plus and chemical fertilizers containing nitrogen in urea form and phosphorus in triple super phosphate form after soil analysis to the amount of 0%, 50% and 100%. The results showed that application of biofertilizers of mycorrhiza and nitrogen-fixing increased number of grain per plant, grain weight per plant and grain yield in pot. Chemical fertilizers also showed significant effect on number of umbellifer. In addition, results revealed that interactive effects of more factors had significant effect on more of the studied properties.

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IMMUNOSTIMULATORY ACTIVITY OF *HERACLEUM PERSICUM* DESF SEED ON THE FUNCTION OF MACROPHAGES IN VITRO

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The seed of *Heracleum persicum* Desf. (Umbelliferae), known to possess direct antifungal, anti-bacterial and anticonvulsant activity properties, has been reported. It was therefore hypothesized that the plant may have immunostimulant properties. Macrophages have an important role in defense against fungal infections such as candidiasis. Active components such as polysaccharides, lectins, proteins and peptides present in plants have been shown to stimulate the immune system. The aim of this study was to investigate the immunostimulatory effects of the aqueous, ethanol and acetone extracts of *Heracleum persicum* (*H. persicum*) on murine peritoneal macrophages *in vitro*.

Mouse peritoneal macrophages were treated with various concentrations of *H. persicum*. The viability of macrophages was evaluated using *MTT assay* and nitric oxide production (*NO*) was assayed using *Griess method*. The *ROS* (Reactive Oxygen Species) production and Fungicidal activity were evaluated by *NBT assay* and *killing method* respectively.

A significant increase in *NO* production by macrophages has been observed using the aqueous extract of *H. persicum* ($p < 0.05$). Moreover, *H. persicum* had an inducing effect on the levels of *ROS* ($p < 0.000$) and a strong fungicidal activity in treated macrophages with 20 mg/ml ($P < 0.036$).

The aqueous extract of *H. persicum* cause significant immunostimulatory activity, using *NO assay*, *NBT assay* and *killing*, on *C. albicans*. To clarify the exact mechanisms of this activity more study should be done with isolated immunostimulator agents.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF ESSENTIAL OILS ON POSTHARVEST DECAY AND QUALITY FACTORS OF TOMATO *IN VITRO* AND *IN VIVO* CONDITIONS

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For increasing the shelf life and control of devastating fungal pathogen grey mould (*Botrytis cinerea*), of tomato fruits during storage were applied using different concentrations of essential oils. First, antifungal activities of essential oils were tested on artificial growth media. The growth of grey mould was completely inhibited by ammi and anise essential oils at relatively low concentrations. In second stage fruits were infected artificially by grey mould spore and then treated by different concentrations of these essential oils. The results of *in vivo* conditions showed that ammi and anise essential oils at all applied concentrations were caused increasing the shelf life and inhibited of grey mould growth on tomato fruits completely in comparison to control. Treated fruits with these essential oils had significantly higher titrable acidity, total soluble solids, ascorbic acid, and Lycopene content compared to control fruits.

INVESTIGATION OF MORPHOLOGICAL PERFORMANCE AND ESSENTIAL OIL OF *SALVIA SCLAREA* IN NATURAL AND AGRO ECOSYSTEMS

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Medicinal plants have different quality in several natural and agro ecosystems. In this experiment which carried out in semnan provienc research center between 1384- 1388, growth performance and oil production of native *S. sclarea* in some natural habitats and in two different agro ecosystems (one in arid and tropical and the other in semiarid and cold zone in semnan province) was examined. This study was conducted in CRBD with three replications. The first inflorescence and then seeds of *S. sclarea* were gathered of natural ecosystems in north of semnan. The pre_test results showed that there were not any significant different among natural habitats in growth performance and oil production. But comparison between natural and agro ecosystems showed significantly different results includes: Maximum germination was obtained in arid agroecosystem and seeds pre treatment with 40C enhanced the germination. Maximum spike, canopy, stem, total inflorescence yield (g/m) and oil yield (g/m) obtained in semiarid agro ecosystem. Highest essential oil content obtained with harvesting and oil extraction of fresh inflorescence at complete full bloom, with hydrodistillation (Clevenger) method. The calyx essential oil content was higher than corolla in *S. sclarea*.

THE INFLUENSE OF DIFFERENT COLLECTION TIMES ON ESSENTIAL OIL CONTENT AND COMPOSITION OF *LAURUS NOBILIS* L.

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Laurus nobilis Linn. (Lauraceae) is an evergreen shrub and widely distributed in the Mediterranean area and Europe. Essential oils of the bay leaf are one of the main products of bay trees which are used in food, spice, flavoring and cosmetic industries. In this study, at first, effect of different collection times in a day including 8am, 12pm and 16pm on the essential oil content and composition of *Laurus nobilis* leaves was investigated. Then, based on the result of first experiment, the changes in the essential oil content and composition of *Laurus nobilis* leaves during a year was studied (harvesting were done each 10 days at 8am). The *Laurus nobilis* leaves were collected during 2009-2010 from National Botanical Garden of Iran in Tehran, and dried in shade. The essential oils were extracted by hydro-distillation and analyzed by capillary gas chromatography (GC) and gas chromatography/mass spectrometry (GC/MS). The mean of leaf oil yields, based on dry weight, were 2.39%, 2.43% and 2.51% in 8am, 12pm and 16pm, respectively. Statistical analysis showed that there is no significant difference ($\alpha = 0.05$) between the oil yields in different times of a day. The highest oil yield was obtained in December (4.4% w/w) and the lowest in May (2.57% w/w). Twenty-three components were identified in the essential oils of *Laurus nobilis* L. The main components in all of the oils were 1,8-cineole, Sabinene, Terpinolene, α -Terpinyl acetate and α -Ylangen [1- 3]. The results of correlation characters showed that there was negative correlation relationship between 1,8-Cineole with α -Terpinyl acetate, α -Terpineol and α -Ylangen in different collection times. There was affirmative correlation relationship between α -Terpinyl acetate with α -Ylangen. There was affirmative correlation relationship between Sabinene with β -Pinene, *p*-Cymene and 1,8-Cineole. There was negative correlation relationship between Sabinene with α -Terpineol, α -Terpinyl acetate and α -Ylangen.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF *PAPAVER BRACTEATUM LINDLE* EXTRACT ON NMRI MICE PRIMARY AND SECONDARY FOLLICLES

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Papaver bracteatum Lindley extract contain antioxidants. Antioxidants have protective effects against free radicals. The formation of free radicals in the body is a natural process that it can be made of environmental factors. Generally anthocyanins are as main components in *Papaveraceae* Family. Purpose: Productions of free radicals in the body have harmful effects on reproduction. *Papaver bracteatum Lindl* extract with antioxidant properties can be prevented of the destructive effects of free radicals. Procedures: In this study, we have investigated the effect of *Papaver bracteatum Lindl* extract on NMRI mice primary and secondary follicles. In this study, female mice at 5-week of age were randomly assigned into two groups (10 mice per group). In control group, mice treated with none. In experimental group, mice treated with *P. bracteatum Lindl* extract alone (200 mg/kg of body weight, intraperitoneally (IP). twelve consecutive days), mice were sacrificed by cervical dislocation after the first administration of *P. bracteatum Lindl* extract. Bouin-fixed ovaries, after treatment. Then ovaries were sectioned and stained by Hematoxylin-Eosin and then the ovarian follicles were counted and categorized. In control group, we did not observe increase in the ovarian follicles reserve. Whereas, the population of primary and secondary follicles in experimental group have increased in comparison with control group. Conclusions: Anthocyanins belong to the widespread class of phenolic compounds collectively named flavonoid. phenolic compounds and alkaloids of the *Papaver bracteatum Lindl* can be used as an Antioxidant. Recent study also showed that Antioxidants could reduce inflammation and oxidative stress. *Papaver bracteatum Lindl* extract, as a medicinal plant with anti-oxidant property [1- 3]

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EFFECTS OF PLANT DENSITY AND MICROELEMENTS ON YIELD AND OIL PRODUCTION OF PEPPERMINT (*MENTHA PEPERITA L.*)

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Peppermint has been one of the popular herbs known since antiquity for its distinctive aroma and medicinal value [1]. The herb has a characteristic refreshing cool breeze sensation when eaten on taste buds, plate and throat, and on nasal olfaction glands when inhaled. This unique quality of mint is due menthol, an essential oil in it [2]. In order to study the effects of plant density and microelements on yield and oil production of peppermint, an experiment was conducted in a factorial based on randomized complete blocks design with four replications at the Agricultural Experiment Station of Sari Agricultural Sciences and Natural Resources University during 2009-2010. Treatments consisted of three levels of plant density (8, 12 and 20 plant m⁻²) and two levels of microelement (spraying and none spraying) that were evaluated at two cuttings. The results showed that peppermint performed better in first than the second cutting. Dry matter, leaf area, plant height, shoots number and although the essential oil percentage of peppermint increased with increasing plant density up to 12 plant m⁻². Spraying of microelements lead to more dry matter production and the essential oil percentage compare to non-spraying. In conclusion, planting in 12 plant m⁻² and foliar application of microelements can be suggested for improving yield and oil production of peppermint.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



INDUCED PRODUCTION OF PACLITAXEL AND SECONDARY METABOLISM IN *TAXUS BACCATA* L. CELL CULTURE BY ULTRASOUND AS ABIOTIC ELICITOR

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Phytoalexins are organic metabolites that are produced by plants in response to biotic elicitor (e.g. fungal infection) or abiotic elicitor such as UV light, heavy metal ions or ultrasound [1]. Paclitaxel (taxol) is one of the most important phytoalexins, which is a potent antimetabolic agent with outstanding activity against various cancers. It is synthesized particularly in the barks and needles of yew trees. The very limited supply of the drug from the plant prompts deep efforts to develop further methods for taxol production. Yew cell culture is the most promising method for the sustainable production of taxol and related taxoids [2]. In this study the effect of ultrasound as an abiotic elicitor on the production efficiency of taxol and some parameters related to secondary metabolism in *Taxus baccata* L. cell cultures was investigated. Ultrasound was given into the system via an ultrasonic bath by the application of continuously ultrasonic irradiation at 40 kHz with 3 power levels (3.5, 13.75 and 61.5 mW/Cm³). Results showed that ultrasound had effects similar to elicitors and while induced defensive responses, stimulate the production of secondary metabolites. Increase in power level of ultrasound waves, while decreased the cell growth, induced production of taxol, malondialdehyde and phenolic compounds and activity of secondary metabolism enzymes such as phenylalanine ammonia-lyase, polyphenoloxidase and peroxidase. Ultrasound at power of 13.75 mW/Cm³ had a significant role on induced taxol production, specific yield and its release by the cells into the medium, which were 8.3 mg/l, 0.62 mg/g dried cell and 62%, respectively. It seems that increase in production of taxol under ultrasound effect is probably due to its elicitor like effects including induction of defensive responses such as increased membrane lipid peroxidation and enzymes activity.

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THE EFFECTS OF ENVIRONMENTAL FACTORS ON THE SPREADING OF MEDICINAL PLANTS COMPONENT IN AGROFORESTRY SYSTEMS IN FARS PROVINCE, IRAN

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Medicinal plants are very important because of their contribution to primary health care by providing an easily accessible and affordable source of medication. Considering the important values that these species have, it is necessary to conserve them and sustain their biodiversity. One conservation strategy is cultivation of these species. Sustainable utilization and production may be ensured by linking their cultivation with agroforestry systems which can effectively replace the collection from wild stands while providing other ecosystem benefits. Agroforestry offers a convenient way of producing many medicinal plants without displacing the traditional crops in agricultural systems. Generally, environmental factors influence the phenology of flowering and fruiting of plants. So it can affect the utilization of medicinal plants in agroforestry systems and their development. This study quantified the effects of rainfall and temperature on medicinal plants component of multipurpose agroforestry systems in Fars province, Iran. Two cities of Sepidan with cold climate and Kazerun with warm climate were selected because of diverse agroforestry systems in them due to other cities in the province. The agroforestry systems and their components including medicinal plants were investigated in the study areas. Also the maps of precipitation and temperature were obtained by analyzing the related data. The observations showed that 12 and 7 agroforests were in Sepidan and Kazerun respectively. Considering the identified components of the agroforestry systems in the study areas, 5 agroforests in Sepidan and 6 ones in Kazerun had medicinal plants in tree and crop components. Although the spreading of pharmaceutical herbs such as Christ's thorn (*Ziziphus spina-christi*), Daphne (*Daphne spp.*), Artichoke (*Cynara cardunculus*) and Milkweed (*Asclepias procera*) was broader in Kazerun, the diversity of the medicinal species like Liquorice (*Glycyrrhiza glabra*), Saffron (*Crocus sativus*), Asafoetida (*Ferula assafoetida*) and Galbanum (*Ferula gummosa*) was higher in 3 locations in Sepidan. The mentioned environmental factors affected significantly on the range of medicinal plants and their species selection by the stakeholders. It was concluded that medicinal plants were an invariable component of agroforestry systems in the study areas. The relationship between environmental factors and the agroforests explained the presence of some medicinal species and their development in the studied components. It is imperative; therefore, that cultivation of such species outside their natural habitats in agroforestry systems ensures their regular supply for human needs as well as to preserve their diversity.



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16, 17 May 2012
Kish Island



TEMPERATURE CHANGED ESSENTIAL OIL CONTENT AND COMPOSITION OF WORMWOOD (*ARTEMISIA ABSINTHIUM* L.) MEDICINAL PLANT

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Artemisia absinthium L. is an aromatic plant of the family Asteraceae, subfamily Asteroideae, tribe Anthemideae and is known by the common name wormwood. The essential oil and bitter principles of the plant underlie its medicinal and commercial significance [1]. Drying process for storing of aromatic plants is important in order to maintenance quality, aroma and original taste. With respect to lack of information about temperature effects on essential oil content and composition of wormwood, this research was conducted and performed. Studies were conducted to show the effect of different temperatures in the drying process on the amount and quality of essential oils of wormwood. The wormwood aerial parts were harvested in full blooming time from an area around the Deylaman city (Guilan province) in north of Iran. In order to complete drying, the aerial parts were placed at shade (room temperature) and in ventilated oven at 35, 45, 55 and 65 °C temperatures. The aerial parts essential oil was extracted by hydrodistillation method in a Clevenger apparatus and analyzed by GC-MS. The results showed that increase in drying temperature significantly decreased the essential oil content from 1.25% at room temperature to 1.12% (35 °C), 0.62% (45 °C) to 0.42% (55 °C) and 0.25% (65 °C) (V/W). Forty seven components were determined in wormwood essential oils, which were mostly monoterpenes. The temperatures had also significant effect on the essential oils composition and proportion of the various components. When temperature increased, some components decreased, while others increased or showed no obvious trend. In general by increasing of drying temperature monoterpenes in essential oil composition gradually were decreased while sesquiterpenes increased and their proportion was noticeable. The major components of essential oils were β -Pinene and β -Thujone for room condition and 35 °C; 8-Cedren-13-ol, β -Pinene and β -Thujone for 45 °C; β -Thujone, Cubenol and Geranyl isovalerate for 55 °C, and Cubenol and Geranyl isovalerate for 65 °C temperatures.

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EFFECT OF VARIOUS TREATMENTS ON SEED GERMINATION AND DORMANCY BREAKING IN *PEROVSKIA ABROTANOIDES*, A MEDICINAL HERB

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Perovskia abrotanoides is an herb belongs to labiateae family [1] that is used to treat leishmaniasis in Iranian folk-medicine tradition and has a variety of biological activities including effects on cardiac function, antioxidant activity and inhibition of aldose reductase. The plant roots are clinically useful for treatment of coronary heart and cerebrovascular disease and viral hepatitis [2]. Main habitats of this species are located within southwestern and central Asia. One of the main problems that prevent sustainable use of medicinal plants is perfect germination of the seeds in the native environment but the same seeds fail to germinate in other locations. Thus increasing percentage of seed germination by laboratory methods can be effective in revival of those plants. The seeds of *P. abrotanoides* were collected from Shahrood (Semnan province, Iran). Our early experiment showed that germination rate of *P. abrotanoides* was low, therefore germination requirements of this plant was investigated in this research. The Seeds were subjected to basal Murashig-Skoog media [1962] supplemented with GA₃ (0-100 mg L⁻¹), Kin (0-10 mg L⁻¹) and BAP (0-10 mg L⁻¹). In the other treatments, the seeds were pretreated by GA₃ (0-2000 mg L⁻¹), freezing (-20 °C, 20 days) and chilling (4 °C, 20 days) and then they transferred to normal condition (23±2 °C). Control treatment was done by soaking method on filter paper with distilled water at temperature of 23±2 °C. All treatments were performed at least in five replicates. Statistical analysis of germination data was done with the SPSS version 18 software package after two months. The highest germination percentage (86.66%) was found by 10 mg L⁻¹ Kin. Among pretreatment tests, GA₃ at 1000 mg L⁻¹ concentration had the lowest germination (22.6%). Chilling (4 °C) same to the control was revealed low germination (25.33% compare to 26.66% in control). We can conclude that low temperature and pretreatments had not critical effect on increasing percent germination but hormone treatments were more successful on breaking dormancy in this species. Among these treatments, Kin was the most efficient in promoting germination and thus it is highly recommended for practical purpose.

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ANTIBACTERIAL ACTIVITY OF HYDRO ALCOHOLIC EXTRACT OF *CITRUS AURANTIUM*

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Citrus aurantium refers to a citrus tree and its fruit, in the family Rutaceae. *Citrus aurantium*, commonly referred to as bitter orange, has been used for thousands of years in Traditional Chinese Medicine to improve overall health. This study was designed to examine in vitro anti-bacterial potential of methanolic and ethanolic extract of *C. aurantium*.

The inhibitory effect of methanolic and ethanolic extracts of leaf of *C. aurantium*, flower of *C. aurantium* and fruit of *C. aurantium* were tested against 2 Gram positive: *Bacillus cereus*, *Staphylococcus aureus* and 5 Gram negative: *Salmonella typhi*, *Kelebsiella pneumonia*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Proteus mirabilis* bacterial species by disc diffusion method at various concentration from 600 mg/ml to 5 mg/ml. The viability of bacterial species was analysed by susceptibility test (minimum inhibitory concentration and minimum bactericidal concentration).

The extracts of flower of *C. aurantium* and fruit of *C. aurantium* were active against: *B. cereus*, *S. aureus*, *P. mirabilis* and *E. coli*, the zone of inhibition for these bacterial species were noticeable. MIC and MBC for hydroalcoholic extracts of flower of *C. aurantium* and fruit of *C. aurantium* have been determined also for four bacteria: *B. cereus*, *S. aureus*, *P. mirabilis* and *E. coli*.

According to the good effects of *C. aurantium* on *S. aureus* and *B. cereus* it has antiseptic effects and could be used as a therapeutic agent and therefore, it appears to be a potent antimicrobial agents that could be considered as a medicinal plant.

THE EFFECT OF LIMITED IRRIGATION REGIMES AND FERTILIZING TREATMENTS ON
MUCILAGE PRODUCTION OF ISABGOL (*PLANTAGO OVATA* FORSK)

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In order to study the effect of fertilizing treatments and limited irrigation regimes on mucilage production of Isabgol, a field experiment was conducted at Experimental Farm of College of Agronomy and Animal Sciences, University of Tehran. The experimental design was a split plot based on a randomized complete block design with three replications. In this research four irrigation regimes including full irrigation, light limited irrigation, moderate limited irrigation and severe limited irrigation, were assigned to the main plots and five fertilizing treatments including control (without fertilizer), chemical fertilizer, combined use of chemical fertilizer and Barvar Phosphate Biofertilizer, cattle manure and combined use of chemical fertilizer and cattle manure, were assigned to the sub plots. The results showed that irrigation regimes had significant effect ($p \leq 0.05$) on all measured traits. Mucilage and grain yields decreased with decrement in irrigation frequency from full to severe limited irrigation but mucilage percentage and grain swelling factor increased; so the highest mucilage yields and grain yield were obtained in full irrigation regime. The highest mucilage percentage and grain swelling factor were obtained in severe limited irrigation. The results also showed that fertilizing treatments had significant effect ($p \leq 0.05$) on all measured traits. The highest mucilage yield (252.58 kg/ha) was obtained in combined use of chemical fertilizer and cattle manure treatment under full irrigation regime. Mucilage percentage and grain swelling factor were significantly higher ($p \leq 0.05$) in cattle manure treatment.

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THE EFFECT OF GROWTH ACCELERATE HORMONE ON SEED DORMANCY AND QUALITATIVE AND QUANTITATIVE CHARACTERISTICS OF THE HERBAL BALNGO *LALLEMANTIA ROYLEANA* (WALL.) BTH

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One of the most important species of medicinal plants is *Balngo* (*Lallemantia royleana*) with Labiates families that with multiple properties, such as a heart tonic, analgesic, sedative, pain, bloating, constipation, cramps, abdominal approach, dry cough, diarrhea demo, fainting and madness, cooling, and asthma, because of mucilage has an important role in controlling reflux disease. The factorial experiment with two factors Masses (species, Shiraz, Mashhad and Isfahan) and acetylsalicylic acid (ASA) (zero, 0.3, 0.6 and 0.9 mM) in a completely randomized design (CRD) with 3 replications was conducted at the laboratory control of seed technology in Shahed University. The results showed that levels of acetylsalicylic acid (ASA) and Balngo masses had significantly ($P \leq 0.01$) effects on normal and abnormal seedling, seeds germination percent, germination coefficients, root to shoot ratio (R/S), mean germination time (MGT) ($P \leq 0.05$), weight indicators Vigor ($P \leq 0.05$), fresh weight of seedlings, allometry coefficient, sensitivity indices, dry weight and proline and soluble sugar content. Masses of Shiraz and Mashhad with 82 and 58 germination percent had the highest germination response to treatment acetylsalicylic (ASA) acid respectively. Hormone concentrations with increasing negative effects of sleep on the germination index, but the rate of seed germination and seedling fresh weight increased. Based on test results, the local population of Isfahan and Shiraz in response to hormones was better other than superior ($P \leq 0.01$). Acetylsalicylic acid level of 0.3 mM on population of Isfahan had the highest germination rate, proline and soluble sugar content. The study also showed the sensitivity of the dormant reaction components of balngo was broken by optimum Acetylsalicylic acid level and seedling growth.

DETERMINATION OF ARTEMISININ IN SOME OF IRANIAN *ARTEMISIA* SPECIES

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Artemisinin is a sesquiterpene lactone, which is the biologically active constituent that for the first time has been isolated from the aerial parts of *Artemisia annua* L. (Compositae). Depend on growing and ecological conditions, the amount of this secondary metabolite could be ranged 0.1–0.8% based on dried material in *A. annua* [1, 2]. Artemisinin mainly is the base of drugs which are used in malaria and cancer therapy. This compound also has anti-fungus, anti-parasite and antimicrobial activities [3]. Thirty-four species of *Artemisia* are known to be represent in Iran which two of them (*A. melanolepis* and *A. khorassanica*) are indigenous [4]. These species are found in different regions of Iran, with desert and semi- desert climates. Based on our knowledge, so far a few of Iranian *Artemisia* species have been studied for the presence of artemisinin. In this work, we focused on the determination of artemisinin in the leaves of 9 Iranian species of *Artemisia*. Leaf samples were collected from wild plants in their natural habitates in different seasons. Leaves were dried in room temperature and artemisinin extraction was prepared by refluxing of samples with ethanol. Ethanolic extracts were used for analysis by HPLC technique with UV detection. Based on our results, species of *A. vulgaris* (0.24 ± 0.002 g/100g dry weight) had the highest content of artemisinin, followed by *A. dracuncululus* (0.14 ± 0.004 g/100g dry weight) and *A. absinthium* (0.1 ± 0.004 g/100g dry weight), while *A. biennis* with 0.01 ± 0.001 g/100g dry weight artemisinin showed the lowest content. In conclusion, among the *Artemisia* plants studied in the present work, *A. vulgaris*, *A. dracuncululus* and *A. absinthium* with considerable contents of artemisinin, appear to be potential new sources of this valuable sesquiterpene compound.

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16, 17 May 2012
Kish Island



INDIGENEOUS KNOWLEDGE OF KHAMSEH TRIBAL FAMILIES ON USING NATURAL MEDICINAL HERBAL PLANTS, FARS PROVINCE

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Curing humans' and livestock's diseases by Medicinal Herbal Plants has a long background of some thousand years between Iranian tribal families. In current research, indigenous knowledge of Khamseh tribal branch on natural medicinal herbal plants has been investigated. Both literature reviews and field observation techniques (interviews and questionnaires), vastly employed in this research. In addition to information on medicinal herbal plants, age, gender, position in tribal hierarchy and etc also collected and summarized. As a result, a list of medicinal herbal plants has been collected through the interviews. The results also confirm a person-to-person mechanism in transferring the knowledge. By increasing rate of using chemical medicines, importance of the knowledge on natural medicinal herbal plants is decreasing. It also indicates that the knowledge of medicinal plants is skills of females, aged between 40 to 60 years old. According to decreasing interest of tribal youth to learn the knowledge of medicinal herbal plants from their ancestors and to save the knowledge, a documentation action has been recommended.

EFFECT OF SEED PRIMING ON SOME GERMINATION TRAITS OF PURPLE CONEFLOWER (*ECHINACEA PURPUREA* L.) GERMINATION UNDER DROUGHT STRESS

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In order to evaluate the effect of drought stress and priming on some germination and seedling growth characters in Laboratorial condition, a study on Purple Coneflower (*Echinacea purpurea* L.) was conducted in base of randomized complete block design with four replications that germinated at the Seed Technology Laboratory of Yasouj University, Iran, in 2011. Treatments were included of three priming levels (zero or no Prime, hydropriming and osmopriming by KH_2PO_4) and four levels of drought stress (0, -1, -2 and -3 bar). The results showed that the interactions of drought stress and prime had a significant effect on germination and seedling growth traits that involved shoot dry weight and length, germination percentage and index, root dry weight. The highest germination percentage and index showed at non-drought condition. There was not any significant differences between three prime in that condition. In all drought levels, the highest germination percentage and index was belonged to priming by KH_2PO_4 . The most germination rate was also relevant to prime with KH_2PO_4 . Maximum shoot and root length obtained with hydropriming application in no stress condition. However hydroprime with rising the drought levels from -2 to -3 bar and KH_2PO_4 in -1 bar caused to increasing the shoot length. Priming with distilled water and KH_2PO_4 in non-stress condition showed the highest root and shoot dry weight in respectively, although there was not any significant difference between them. root and shoot dry weight decreased by increasing the drought levels, but the priming with distilled water in -2 bar and KH_2PO_4 in -3 bar condition, improved them [1-3].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



STIMULATION OF SEED GERMINATION OF FENNEL (*FOENICULUM VULGARE* MILL.) USING
WITH MAGNETIC FIELD TREATMENTS

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Physical treatments such as magnetic fields are able to improve the seed germination and growth of plants. In order to evaluate the effect of intensities and exposure times of magnetic field on fennel seed germination an experiment was conducted based on randomized completely design with four replications in laboratory of Ferdowsi University of Mashhad, Iran. The experiment treatments were including 12 treatments as two levels of magnetic field intensities (pretreatment of seeds with 15 and 25 mT) and five exposure durations (1, 5, 15, 25 and 60 minutes), permanent magnetic field with intensity 3 mT and control. The experiment results showed that studied treatments had not significant effect on germination percentage. The lowest mean germination time (MGT) was observed in 15 mT magnetic field with 25 and 15 min exposure times that were 8 and 13% lower than control treatment. The highest shoot length was achieved in 15 mT magnetic field with 25 min exposure duration and the lowest was shown in control. Magnetic field treatments increased root length by 46 percent in comparison to control. As a result, it seems that low magnetic field with medium durations improved the germination traits of fennel.

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EFFECT OF CHLOROFORM EXTRACT OF *ZIZIPHORA*
CLINOPODIODES ON INFLAMMATION IN MALE MICE

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In various cultures and also community medicines, this plant has got different names and different usage as well, including pain sedation in body parts like legs, backbone and also is used to eliminate body-aloofness and its resulting pains, in line with disinfection and inflammation effacement. Because of those above mentioned reasons, this herb and its anti-inflammation properties are investigated in this research.

This study has been done on NMRI male mice of 20-25 g in weight. In inflammation test, they were divided into 5 groups, including the sham group, positive control (receiving dexamethasone with a dosage of 15 mg/kg) and 3 groups with receiving dosage of 250, 500 and 1000 mg/kg of chloroform extract of *Ziziphora clinopodioides* leaves, and xylene was used to maintain inflammation. All of drugs was injected of intraperitoneally 15 minutes before the test. The resulting data were analysed through of one-way-ANOVA and Tukey post test. Chloroform extract of *Ziziphora clinopodioides* leaves with dosage of 250, 500 and 1000 mg/kg ($p < 0.001$) caused a meaningful decrease in inflammation.

Chloroform extract of *Ziziphora clinopodioides* leaves, has got anti-inflammation properties. This effect may be monoterpens specially Pulegone in chloroform extract [1-10].

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POSSIBILITIES AND LIMITATIONS OF PRODUCTION, TRADE AND INDUSTRY OF MEDICINAL PLANTS IN IRAN

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In recent decades use of drugs with natural source to lead to develop of producing of medicinal plants, processing and formulation of herb drugs and their trade in the world. Population growth and pressing requirements of pharmaceutical industries to medicinal plants as raw material for drug production, inability of artificial production of some vital drugs by pharmaceutical industries and the importance of effective constituents of medicinal plants in food, cosmetics and beauty industries have spurred research on these plants in view of their culture, production and consumption. The use of medicinal and aromatic plants has very long history in the World. According to WHO, 20 000 plants have been used for medicinal proposes, 4 000 of them have been used commonly and 10% of those are commercial. There are some reasons that products of medicinal plants cannot be used on gathering from natural fields. The survey of production and exportation of medicinal herbs showed that agriculture must be the economic base for these products. Cultivation of these plants needs economic surveys and justifications. Standardization of medicinal plants from cultivation till active substances extraction and their processing is recommended: 1- Using of bred medicinal plants for cultivation to increase quality level of herbal medicine. 2- Study the effects of environmental factors on the productivity of medicinal plants to find out the suitable location for every considered medicinal plant. 3- Study on domestication of endemic medicinal plants to prevent of their decline. 4- Mechanization of cultivation, protection and harvesting of medicinal plants not only to produce high quality herbal drugs but also to decrease the production expenses. 5- Formulation of active substances of medicinal plants on the basis of scientific references. 6- Investigation on the packing and storing of herbal drugs at different climatic conditions. Marketing of products is one of the main existed difficulties on the way of growth and development of medicinal plants. Correct marketing cause products generate consumer needs and the consumers can obtain these products hygienicly and admirably. Because of particular properties of medicinal plants such as decaying, seasonality and huying the marketing of these products has much sensibility. Marketing operations are storage, transportation, sorting, packing and transformation. Variation of climate and diversity of plants species in Iran are the best reason for incoming to trade of medicinal plants and herb drugs. Unfortunately our country, despite a high potential for production and export of medicinal plants, has not proved successful in practice.

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**EFFECT OF PLANTING DATE AND PLANT DENSITY ON YIELD OF GARDEN MARIGOLD
(CALENDULA OFFICINALIS L.) IN BORUJERD**

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Calendula officinalis L., herbaceous and permanent plant, belongs to Asteraceae family. Aerial stem is raised, branched and covered with node naps. Its flower is yellowish. To investigate the effect of sowing date, plant density and interaction effect of them on pot marigold yield, a split-plot experiment was conducted on the basis of completely randomized blocks design with 4 replicates in Research Greenhouses of Eghtesad Keshavarzi Novin Borujerd, an economic agricultural company, in 89-90. sowing date includes? In main plot and density includes 4 levels (15, 25, 35, 45 plant.m⁻²) in sub-plot. Results showed that sowing date and plant density had significant (P< 5%) effect on pot marigold yield. The most and the least seed yield was related to sowing dates of February 10th and May 25th in 38.24 and 29.35 g.m⁻², respectively. Among different densities, the most thousand seed weight was in density of 45 plant.m⁻². Results of statistical analysis showed that interaction effect of different sowing dates and plant density had non-significant effect on mentioned parameters. According to these results, density of 4 plants. m⁻² and sowing date of February 10th is recommended in Borujerd climate.

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STUDY OF MEDICINAL PLANTS USEFUL IN HYGIENIC AND COSMETICS INDUSTRY
(STUDY IN LORESTAN PROVINCE)

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Desire of Iranian women for the consumption of hygienic and cosmetic tools has facilitated smuggling in a way that according to unofficial statistics, only 10% of cosmetics in Iran has been entered from legal and valid passages and 90% of these tools penetrates in internal market in smuggled and illegal way and without any supervision on quality and their production or maintenance methods. Irregular entrance of smuggled cosmetics has become out of control of challenge with smuggled goods administrators such a way that every year more than 800 million \$ cosmetics has been entered to the country in illegal way. To investigate herbal cultivars, useful in hygienic and cosmetics industry, first in field experiments they were recognized and collected with help of native knowledge and valid references. Usages in hygienic and cosmetics industry and useful parts of these herbal cultivars were specified. Finally they were analyzed with Excel software. Results showed that from all these cultivars 61.4% were herbaceous and they had the most usages in treatment of skin illnesses. 27.3% of them were shrubs that 50% of these plants were applied in hygienic industry and rest of them that included leaves of different cultivars were applied in treatment-cosmetics industry. Because of province climate and existence of several pharmacy factories, it is essential to conduct extensive investigations.

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POLLEN MORPHOLOGY OF GENUS *CARPINUS* IN HYRCANIAN FOREST

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Carpinus genus is an important element in the Hyrcanian forest that that In addition to the environmental value, have economical benefits for example Leaf and rhytidome of this genus have Medicinal value, that extensively are distributed in the forest, Unfortunately, the habitat of its is destruction. Thus the need for Comprehensive studies for investigated genetic diversity on the one hand and disagreement among researchers about the number of species on the other hand , necessity for accurate and comprehensive studies in cases of this Genus is necessary, also in this study Pollen morphology of 3 species of the genus *Carpinus* in hyrcanian forest was investigated whit using light microscopy (LM) and scanning electron microscopy (SEM), The pollen grains are tetraporate and triporate in *Carpinus betulus* and tetraporate in *Carpinus schuschaensis*. The shape of the pores is more oblate – spheroidal and less oblate and size of pollen is medium, the largest pollen were show in *Carpinus betulus* and smallest in *Carpinus orientalis*. Exin is very thin from 1.2 μm in *Carpinus betulus* to 1.6 in *Carpinus orientalis*, pollen wall have subtle granular Sculptural elements that *Carpinus orientalis* has highest Sculptural dense. Certainly, the current results emphasis that pollen studies useful in survey variation in this genus.



EFFECT OF METFORMIN ALONE VERSUS METFORMIN AND NATURAL HONEY ON BODY WEIGHT AND FASTING BLOOD GLUCOSE IN STREPTOZOTOCIN (STZ) INDUCED DIABETIC RATS

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Diabetes mellitus is one of the five leading causes of death globally [1, 2]. Despite of its management, both microvascular and macrovascular complications, partly linked to oxidative stress, are not efficiently prevented [1]. Recently, interest on the role and use of natural antioxidants for prevention of oxidative stress and free radical damages in diabetes has been increased. In the present study, the effect of Metformin alone was compared to combined Metformin and natural honey on body weight and fasting blood glucose in diabetic rats.

Male adult Wistar rats weighing 200 ± 20 g were used. Diabetes was induced by a single dose of Streptozotocin (65 mg/kg; ip) [2, 3]. Rats were randomly divided into four groups and treated as follows: C: non diabetic rats received distilled water, D: diabetic rats administered with distilled water, M: Metformin treated diabetic rats, M+H: combination of Metformin and natural honey treated diabetic rats. The animals were treated by oral gavage once daily for four weeks. Fasting blood glucose and body weight were measured weekly.

Fasting blood glucose was significantly increased in diabetic rats. Administration of Metformin alone or in combination with natural honey significantly reduced the elevated blood glucose levels in diabetic rats. At the end of the treatment period, STZ-treated rats had significant reduction of body weight. Metformin did not improve body weight in diabetic rats. In contrast, combination of Metformin with natural honey significantly improved body weight compared to both the diabetic control and Metformin-treated diabetic rats.

Application of simultaneous Metformin and natural honey has more therapeutic effect in STZ-induced diabetic rats than Metformin alone.

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PARTIAL PURIFICATION AND CHARACTERIZATION OF PEROXIDASE FROM KOHLRABI (*BRASSICA OLERACEA GONGYLODES*)

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Kohlrabi (*Brassica oleracea gongyloides*) is a member of the Brassica genus that will grow anywhere and used as a food in traditional medicine. Peroxidases (EC 1.11.1.7) are heme-proteins which utilize H_2O_2 to catalyze the oxidation of a wide spectrum of organic and inorganic substrates. Peroxidases are widely used in immunoassays as antibody labels. Also, some promising prodrugs convert into active radicals in cancer cells during biocatalytic reaction that they could be scavenged when used as peroxidase substrates [1]. For these reasons purification and determination of peroxidases are important. In this study, peroxidase was extracted and purified from kohlrabi bulbs with 0.02 M phosphate buffer, pH 6.8 [2]. The biochemical and kinetic characteristics were studied by spectrophotometry and PAGE methods. Precipitation of the enzyme was performed by addition of ammonium sulfate to crude extract in two steps saturation (30% and 80%) and sediments were dialyzed. The dialyzed proteins fraction was loaded onto DEAE-sephadex A-50 column (3.5×15 cm). Eluted Fractions were collected and analyzed for activity of peroxidase [3]. Effects of pH and temperature on its activity were determined with guaiacol as electron donor. Optima were obtained at pH 5 and at 30°C. Thermal and pH stability studies showed that significant decrease in peroxidase activity at above 60°C and highly acidic and highly alkaline pH (pH 2-4 and 9-10). The purified enzyme showed that maximum thermal and pH stability at 45°C and pH 5-6. Effects of substrates inhibition was appeared for guaiacol at 75 mM and for H_2O_2 at 10 mM. Kinetic parameters of K_m and V_{max} values were obtained 3×10^{-5} M and 3.3×10^{-3} M min^{-1} , respectively, for this enzyme in the presence of H_2O_2 and guaiacol as hydrogen-donor co-substrate.

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Kish Island



EXTRACT OF THE HERB PURSLANE (*PORTULACA OLERACEA* L.) ON GERMINATION CHARACTERISTICS OF WILD MUSTARD

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Allelopathy properties of plants, can lead to the discovery of biological herbicides and growth inhibitors that the ecological and biological mechanisms. In fact, the inhibitory effects of physiological processes are the material recipient of allelochemical on plants or microorganisms. Wild mustard (*Sinapis arvensis* L.) is one of the most important weeds in canola crops. Effects of alcoholic extract allelopathy of herbal purslane (*Portulaca oleracea* L.) on germination characteristics of wild mustard a completely randomized design with three replications in 2010 were conducted. Treatments were included alcoholic extracts of purslane herb at zero concentration (distilled water) and 50% were used. The test results showed that purslane herb extract was significant negative ($P \leq 0.01$) influence on mustard seed germination. So the severe inhibition of germination and don't germination seed treated with extracts of purslane. According to these results the possible inhibition effect on crop by Purslane extract, and it is suggested that influence extract on the germination of the crop and lower concentrations on the germination of weed and crop.

ESSENTIAL OIL COMPOSITION IN BERRIES OF *JUNIPERUS FOETIDISSIMA*

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The spherical blue-black seed cones of the genus *Juniperus*, commonly known as "Juniper berries" are widely used in foodstuff flavors and pharmaceuticals [1]. Actually, the main impact on the perception of Juniper berries in pharmaceuticals should be related to the presence of several aromatic lipophilic compounds [2]. However, in the face of the medicinal and economical importance of Juniper berries, little information is available regarding the chemical composition of its scent. The paucity of information could be owing to restricted geographical distribution of the many species. In this study, we aimed to identify the essential oil composition in berries of *Juniperus foetidissima* as one of the evergreen species of the Iranian highlands. Essential oil composition in berries of tree has been analyzed by capillary GC and GC-MS. The identified compounds were united by their terpenoid or aliphatic skeletons and low molecular weight. Above all, the significant presence of some bioactive compounds such as Sabinene (16.40%), α -Pipene (13.91%), β -Thujone (12.34%), 1-Limonene (12.31%), Myrcene (5.28%) and α -Thujone (4.36%) was attention-grabbing. In comparison to other species of *Juniperus*, the nature and quantities of the essential oil components in berries of *J. foetidissima* were markedly different [3, 4]. Our results contribute towards the chemical information available on chemical components in *Juniperus*, helping to broaden the platform for further studies on essential oil of this genus.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECTS OF LIGHT AND NITROGEN LEVELS ON GROWTH AND SOME PHYSIOLOGICAL CHARACTERISTICS OF *HYPERICUM PERFORATUM* L.

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There is great interest in plant-based drugs owing to several side-effects of chemical ones. *Hypericum perforatum* L. is a well-known medicinal plant containing high secondary metabolites pool and having great preparation diversity. A field experiment was arranged to evaluate the effects of light (full light, 75% and 50% of full light intensity) and nitrogen supply (control, 100 and 200 kg ha⁻¹) on its growth and total hypericin content as split plot based on RCBD with three replications. The results showed that plant height, number of branches per plant, fresh and dry weights of plant, gland number per leaf, Chlorophyll content, diameter of glands, total hypericin content and hypericin yield were affected by the treatments. Increasing nitrogen and light level had ascending effects on all traits. There are positive linear relations ($R^2=0.93$) between hypericin content and leaf glands number. It seems that appropriate management of light and nitrogen both are two predominant factors affecting of growth, productivity and hypericin accumulation in *H. perforatum* plant.

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IN VITRO INHIBITORY EFFECTS OF QUERCUS SEED COAT ON *HELICOBACTER PYLORI*

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An impressive number of modern drugs have been isolated from natural sources, notably from plant origin [1, 2]. The antimicrobial activity of plant extracts have evaluated with antibiotic susceptible and resistant microorganisms. *Helicobacter pylori* is a helix-shaped or spiral-shaped, Gram negative bacterium. In the present study, the disc diffusion method were used to determine the growth inhibition of *H. pylori* by quercus seed coat extract and micro-broth dilution method for determine of minimum inhibitory concentrations. Stock solutions (100 mg/ml) of extracts were prepared in suitable solvents (Ethanol and water) and filtered using 0.2 μ m sterile filters. The extract showed anti-bacterial activity.

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POST-TRAINING INJECTION OF EXTRACTION OF *SALVIA OFFICINALIS* LEAVES DECREASES THE IMPAIRMENT EFFECT OF THE MORPHINE ON RETRIEVAL

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Several studies have shown that leaves of *Salvia officinalis* have a wide range of biological effects, including memory formation [1, 2]. On the other hands, there are numerous reports that morphine impairs retrieval in different models of memory [3]. In present study we assessed the possible preventive effect of extraction of *Salvia officinalis* leaves on memory deficits induced by morphine.

Male adult albino rats (200-250 gr) were used in this study. The animals were trained on the day one with an unavoidable foot-shock in dark chamber of step-through apparatus. They were received post-training subcutaneous (sc) injections of extraction of *Salvia officinalis* leaves, saline and morphine immediately after training. Retention tests were performed 24 h later and step-through latency (STL) to enter dark chamber were recorded as measures of passive avoidance memory.

Results indicate that post-training administration morphine (5, 7.5 mg/kg, sc) and extraction of *Salvia officinalis* leaves (40, 60 mg/kg, sc) dose-dependently impaired and potentiated memory retrieval, respectively, in animals when tested in test day. Post-training of ineffective dose of extraction of *Salvia officinalis* leaves (20 mg/kg, sc) before the morphine (7.5 mg/kg, sc), reversed memory retrieval.

On the basis of these experiments, it seems that extraction of the *Salvia officinalis* leaves prevents impairment effect of morphine on memory retrieval in the passive avoidance task.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



RESPONSES OF HOLY BASIL TO INOCULATION WITH *ARBUSCULAR MYCORRHIZAL FUNGI* AND FERTILIZATION WITH DIFFERENT PHOSPHATE SOURCES

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Arbuscular mycorrhizal fungus (AMF) can change some morphological and physiological characteristics of host plants [1,2]. A pot experiment was conducted to evaluate the responses of holy basil (*Ocimum sanctum*) to the inoculation with AMF species (*Glomus mosseae* and *Glomus versiforme*) and the use of two different phosphate sources (superphosphate and rock phosphate) as phosphorus fertilizers in a calcareous soil. After a growth period of three months, morphological parameters, root colonization, phosphorus concentration and uptake, chlorophyll content, and the yield of essential oil were measured. AMF significantly increased shoot biomass, flower stem length, chlorophyll content, phosphorus concentration and uptake, and root colonization. Phosphorus fertilizers increased all factors except for root colonization compared with the control. Superphosphate was more effective than rock phosphate and control treatments. A synergistic relationship between AMF and phosphorus fertilizers for improving phosphorus uptake and morphological characteristics was observed. Maximum shoot biomass, phosphorus concentration and uptake, as well as essential oil yield were observed when *G. versiforme* was combined with superphosphate. Rock phosphate combined with inoculation with *G. versiforme* showed a more positively significant ($P \leq 0.05$) effect on all measured traits compared to a single application of rock phosphate. In conclusion, the introduction of AM biofertilizer together with the balanced application of P-fertilizers will be helpful in *O. sanctum* production.

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INFLUENCE OF *GLOMUS MOSSEAE* AND LICORICE PULP ON GROWTH OF *CALENDULA OFFICINALIS* L.

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Arbuscular mycorrhizal fungi and organic fertilizers can influence on plants growth [1]. A pot experiment was conducted to study the effects of arbuscular mycorrhizal fungus and Licorice pulp on the quality and quantity characteristics of pot marigold (*Calendula officinalis* L.). A completely randomized design with a factorial arrangement was used. Factors were included 1) arbuscular mycorrhizal fungus, (*Glomus mosseae* and control), 2) four levels of Licorice (control, 5, 10 and 20% (v/v)). The measured factors were morphological characteristics, root colonization percentage, chlorophyll content, total flavonoid, N, P, and K concentrations and uptake. According to the results, inoculation of pot marigold roots with arbuscular mycorrhizal fungus significantly increased all measured factors. Morphological traits, dry weight and nutrients uptake of plant significantly increased at low levels of Licorice pulp application, while at the maximum level significantly decreased as compared with control. Root colonization percentage, chlorophyll content and total flavonoid were the higher than control at all levels of Licorice pulp application. A positive and synergistic effect was observed in co-application treatments of 10 and 20 levels of Licorice pulp and *Glomus mosseae* in comparison with singly application of Licorice pulp for measured parameters.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



RECOVERY OF ANTIOXIDANTS FROM PLANT SOURCES AND METHODS FOR DETERMINING ANTIOXIDANT CAPACITY IN FOOD INDUSTRY

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Today the researches have been showed that consumption of the synthetic antioxidants as the food additive can harmful and in danger health of human. Therefore have been done many researches about use of the natural antioxidants instead of the synthetic antioxidants. Numerous naturally occurring phenolic antioxidants have been identified in plant sources and vegetable extracts. Natural antioxidants allow food processors to produce stable products with “clean” labels that tout all-natural ingredients. Various chemical in vitro assays have been developed to measure antioxidant capacities of plant products. A number of these assays: DPPH, FRAP, TEAC, β -caroten linoleic acid, FI [1-9].

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CHEMICAL COMPOSITION OF ESSENTIAL OIL FROM SEEDS OF *ANETHUM GRAVEOLENS* L. CULTIVATED IN IRAN

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Dill (*Anethum graveolens* L.) is an annual herbaceous aromatic plant and belongs to Apiaceae family. Dill is used extensively as flavoring agent by the food industry and is well-known for its pharmaceutical properties such as carminative, stomachic and diuretic. It has been used for increasing the flow of milk in nursing mothers, aches in the stomach and intestine, bladder inflammation, liver disease, headaches, cramps, insomnia and its anti-hyperlipidaemic activities. Dill water is given to baby to treat gripe, relieve hiccups and colic. The essential oil of this medicinal plant can be found in the aerial herbs and the mature fruits. The composition of the essential oil is known to depend on the habitat. So qualitative and quantitative differences exist in dill seed oil obtained in different localities. Therefore it seems interesting to review and compare the composition of essential oil of dill seeds growing in different parts of the world. We used GC/MS to investigate the structure of the isolated compounds. The fruits of *Anethum graveolens* collected in Zardband (North of Tehran, Iran) at their full maturity were harvested and naturally dried in shadow. Then the essential oil of the seeds was extracted by water distillation from 30 g powdered dill seeds for 3 hours. The yield of essential oil was 3.7%. A total of 14 chemical compounds were identified in essential oil of dill seeds growing in Iran. The contents of oil components were Carvone (66.99%), Limonene (22.46%), α -Phellandrene (4.72%), *trans*-Dihydro carvone (3.10%), Metha-cymene-8-ol (1.03%), *p*-Cymene (0.44%), *cis*-Dihydro carvone (0.27%), Myrcene (0.25%), *n*-Nonanal (0.16%), α -Pinene (0.13%), Pinocarvone (0.13%), *trans*-Carvone oxide (0.07%), 2-Nonanone (0.05%), *p*-Menth-3-en-8-ol (0.04%). Carvone as the major component of dill seeds oil can be applied in preventing premature sprouting of potatoes during storage, food and flavor industry, air freshening products and in aromatherapy. Also Limonene as the second important component of dill seeds oil is utilized as insecticide and has diuretic and anti-cancer effects. These components together with the other aforementioned characteristic components of the oil confirm the conception that ecological (soil and climate) conditions affect the composition of the dill seed oil, both qualitatively and quantitatively [1, 2].

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EFFECTS OF SEED HETEROBLASTY ON GERMINATION CHARACTERISTICS OF FLIXWEED (*DESCURAINIA SOPHIA* L.)

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To investigate the effects of seed heteroblasty on germination and seedling vigor in flixweed (*Raphanus raphanistrum* L.) this study was conducted in 2010. In laboratory and greenhouse experiments, germination and seedling growth studies were conducted on seeds harvested from different seed positions and heights of mother plant of flixweed by factorial in completely randomized design using four replications. Treatments consisted of three heights of mother plant (40-60, 60-80, 80-100 cm) and three seed positions within the inflorescence including: 1- Seeds in low part of inflorescence (seeds of the first to fifth siliceous in inflorescence), 2- Seeds in middle part of inflorescence (seeds of the sixth to tenth siliceous in inflorescence), 3- Seeds in upper part of inflorescence (seeds of the eleventh to fifteenth siliceous in inflorescence). Results in laboratory showed that among three heights of mother plant, the seeds of the sixth to tenth siliceous in inflorescence had the maximum germination percentage and produced the tallest length of radicle. Also, in height of 60-80 cm of mother plant, the seeds of sixth to tenth and first to fifth siliceous in inflorescence produced the tallest length of primary shoot. In greenhouse experiments, the seeds of sixth to tenth siliceous of inflorescence in height of 60-80 cm of mother plant produced the maximum number of plants and the seeds that harvested from sixth to tenth siliceous of inflorescence in height of 80-100 cm of mother plant had the maximum height of flix weed radish. Generally, variation of seed heteroblasty along the mother plant in flixweed had important role in dispersal and survival of this medicinal useful plants in arid and semi arid area [1-6].

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EVALUATION OF OSMO-PRIMING TREATMENTS ON GERMINATION CHARACTERISTICS OF HENNA (*LAWSONIA INERMIS*)

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Henna (*Lawsonia inermis*) is an important medicinal plant growing in arid areas. One of the problems that limit the germination of seeds in this plant is a rapid decrease of seed vigour in storage. A laboratory experiment was designed to study the effects of osmo-priming (distilled water, CaCl₂ 10 mM, NaCl 50 mM, KNO₃ 1%, KCl 4%, and salicylic acid 0.5 mM) and priming time (5, 10 and 20 hr) on the germination indices. The experiment used was conducted at Darab Faculty of Agricultural and Natural Resources, Shiraz University Iran in 2009. Results showed that time of germination, seedlings uniformity, growth rate, the percent of germination and seed vigour, were significantly affected by priming treatments, KNO₃ 1% for 10 hr, and salicylic acid 0.5 mM for 20hr improved the rate of germination and seedling vigour by 21 to 36% compared to control. Electrical conductivity of seeds extracts also decreased by when they were treated with KNO₃ and salicylic acid. This could be related to the increase of active alpha amylase content of seeds [1-6].

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THE ANESTHETIC EFFECT OF VALERIAN EXTRACT ON COMMON CARP (*CYPRINUS CARPIO*)

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Given the widespread use of anesthesia in fish and aquatic researches and conventional medicines, the need for anesthesia, accessible, affordable and safer for humans, it seems necessary. Hence, relying on the use of medicinal plants and the benefits of this research was to use this material.

For testing, valerian extracts were prepared using Masrasyvn. Average total length and weight of Common carp were 12.48 ± 1.85 cm and 27.25 ± 7.99 , respectively. In this study, after the initial study, the herb valerian extract was measured at concentrations of 4.15 (750 cc) and 6.81 (1500cc) grams per liter was used. For each concentration, 5 fish (randomly) were considered at three replicates. During the experiment, temperature, pH, salinity of water and Hardness were 21°C , 6.7, 1.02 ppt and 651 mg/L CaCO_3 , respectively. All changes were observed during anesthesia and resuscitation.

Data analysis based on anesthesia, complete anesthesia and the onset of jerky movements and Gill cover movements revived during the onset and recovery was complete. Statistical analysis was performed using ANOVA and Duncan test.

Results showed that the concentrations used in some indicators including complete anesthesia and start a movement of the gill cover were significant differences ($P < 0.05$), but the other indices (Jerky movements and fully restore order) didn't show any significant difference between treatments ($P > 0.05$). and the time obtained for the indices decreased with increasing concentrations of valerian extracts and the shortest time for all indices were obtained in the concentration of 6.81 grams per liter. Jerky movements and complete anesthesia in 6.81 and 4.15 grams per liter were 75 ± 15 , 105 ± 15 ; 411.3 ± 86.5 , 575.3 ± 24.5 seconds, respectively and start a movement of the gill cover and fully restore order were 31 ± 9 , 55 ± 5 ; 452.3 ± 77.5 , 456.7 ± 17.5 seconds, respectively. According to these results, it's recommended to research some other concentrations for obtaining the best anesthetic concentrations.

MANAGEMENT OF DEPRESSIVE DISORDERS IN IRANIAN TRADITIONAL MEDICINE

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Major depressive disorder is currently the fourth leading worldwide cause of disability and burden of diseases. Projections for the year 2020 suggest that this disorder will rise to become the second most important cause of disability-adjusted life years, behind only ischemic heart disease (World Health Organization, 2001) [1].

The pharmacotherapy of depression includes tricyclic antidepressants, monoaminoxidase inhibitors, and the so-called selective serotonin reuptake inhibitors. Though efficacious for the treatment of depression, these antidepressant drugs frequently produce side-effects; for instance, dry mouth, mydriasis, constipation, sleepiness, temporary fatigue, restlessness and headaches which creates a need for research directed toward finding alternative solutions for the adequate management of depressive disorders. Such an approach to this problem may be found in natural medicine, which has played a crucial role in keeping people with a low economic status healthy since ancient times [2].

Melancholia (black bile) in Iranian traditional medicine is very close to depressive disorders and its treatments include foods (like fig and almond), medicines (purgatives like *cuscuta epithimum*) and procedures (phlebotomy) [3]. Given the important role of inflammatory cytokines in depression and reduce them by phlebotomy, and the role of poor nutrition in disease in today's world, this article tries to study managements of melancholia due to Iranian traditional medicine hoping to find better solutions to control this disease.

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Kish Island



EFFECTS OF MEDICINAL PLANTS IN THE KHORASAN REGION, JOINT PAIN AND ARTHRITIS

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The palliative treatment of arthritis and arthritis pain drugs that prevent or delay to treatment, pharmaceutical agents should be used as an adjunct to non Pharmacologic measures. Wear the most common joint disease, joint pain and disability in the elderly is the most common. In women's wear and men wear hip and knee joints is more common. Signs of joint wear are more common in women. Others who are more overweight people wear knee. Diabetes, high blood pressure and increased blood Uric acid increase chances are joint wear. Wear your joint pain usually indicates that the wear rate, is much more pain. The joint pain caused by muscle weakness and pain in muscles and joints associated with it is. Strengthen the muscles, the pain is reduced. Some cases of dry joints of the body after waking up and complain, but it usually takes half an hour less than the body dry. Osteoarthritis, Rheumatoid Arthritis and Gout are the three types of the most common forms of Arthritis among the elderly. However, Osteoarthritis is more common than other types but none of these symptoms are not contagious and infectious to warm the neck bones, neck muscles to relax and strengthen the joints were Vtrmym. Therefore, the plants become, thyme, damask rose, chamomile, Nsl, coconut, olive, were used. In experiments conducted at each stage of the test work was to consider the various stages of progress. Should be in different phases to the liquid, colorless or yellowish clear become the Hla Lhay public oils to be. Gravity of the oil between 0.90 0.915, which in alcohol 90% solution is. Mohammadi flower essence is a two-part solid and liquid. The solid melts at a temperature of 33 degrees. The liquid that contains 45 to 70% Geraniol and 20 to 40 percent Sytrvnl is tight. Kapitol alkaloids chemical that is used for relief. 73% of chemical compounds mixed with olive Evelyn Palmtyn and Lynvlyyn form. In addition to the oral form Mlydny the oral form is used on the skin. Thyme leaves contain tannin liquid specific gravity between 0.911 and 0.925 are yellow. Nsl follicular stimulating effects on the skin's barrier. Effect on the heart as well. Coconut is derived from a substance called Kuku and Bourd. Also used to relieve inflammation and swelling of the eye is placed. The test on patients of all ages about the Khorasan region was tested on the patient's age was used in the Khorasan region. Influence of drugs to relieve pain and calm the old in many cases the results showed. More than about 70 percent complete as a whole saw their pain.

CHARACTERIZATION AND EVALUATION OF ANTIOXIDANT ACTIVITY IN FLORAL NECTAR
OF *PEGANUM HARMALA* L. (ZYGOPHYLLACEAE)

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Antioxidative properties of *Peganum harmala* floral nectar, a herbaceous medicinal perennial of the family Zygophyllacea, was analysed using ascorbic acid as the standard antioxidant. Free radical scavenging activity was evaluated by stable 1, 1-diphenyl-2-picrylhydrazyl (DPPH) free radical, which shows a strong absorption band at 517nm. The overall antioxidant activity of *P. harmala* floral nectar was strong. The IC₅₀ value of the nectar was 101.45±1.7 µg/ml and that of ascorbic acid was 94.52±2.6 µg/ml.

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16, 17 May 2012
Kish Island



HIGH FREQUENCY OF TRANSFORMATION OF *ARTEMISIA SIEBERI* WITH ROL GENES

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Artemisia sieberi is an aromatic perennial plant including many secondary metabolites. Newly Pharmaceutical aspects like anticancer and anti bacterial activity was reported for this plant. Hairy roots were produced by inoculating leaf explants with wild type of *Agrobacterium rhizogenes* strain ATCC15834 (the agropin type plasmid pRi 15834). This plasmid contains two T-DNA regions called TR-DNA and Ti-DNA. These two T-DNAs are separated from each other by about 24 kb of non-transferred DNA. The Ti-DNA has a length of about 20kb and it contains 18 open reading frames. ORF 10,11,12,15 coincided with *rol* A, B, C and D these *rol* genes are the main determinates of the Ri phenotype [1, 2]. We used the leaves of one month sterile plant of *A. sieberi* as explants in inoculation medium for 5 min. The explants transferred to co-cultivation mediums for 48 h. after that, the explants were placed on MS medium supplemented with 300mg/l cefotaxim. 3 weeks later we obtained hairy roots and one month later the molecular analysis was carried out all of the putative Ri lines were transgenic by confirming the presence of T-DNA with PCR amplification. The genomic DNA was extracted from transformed root tissue using CTAB DNA isolation method in order to show the integration of Ti-DNA of *A. rhizogenes* in transgenic root, segment from Ti-DNA region was amplified using the gene specific primers (*rol* B).

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**ANTI SEIZURE ACTIVITY OF NEROLI
(*CITRUS AURANTIUM* FLOWERS ESSENTIAL OIL)**

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According to the WHO about 450 million People in the world have suffered mental, neurological or behavioral Problems in their life. Extensive research on Plants and their derivatives has taken place in recent years that could provide some new alternative treatments and therapeutic uses for diseases of the central nervous system (CNS). *Citrus aurantium* L. is commonly used as an alternative treatment for insomnia, anxiety and epilepsy. We promoted to evaluate the antiseizure activity of *C. aurantium* flower's essential oil. The threshold for the clonic seizure induced by intravenous administration of pentyleneterrazole was assessed in mice (20-25 g). Intraperitoneal administration of Neroli (20, 40 mg/kg) 1 hour before PTZ increased clonic seizure threshold compared to vehicle (sweet almond oil), P < 0.01. The combination of subeffective dose of Neroli (20 mg/Kg) and diazepam (0.25 mg/kg) potential the anticonvulsent effect, that inhibited by flumazenil (0.5 mg/kg). The result showed that Neroli is useful for treatment clonic seizure and these effects may be related to effect of it on GABAergic system [1-6].

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EFFECT OF DIETARY INCLUSION OF TURMERIC AND CINNAMON POWDERS ON SOME IMMUNE SYSTEM PARAMETERS IN BROILER CHICKENS

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This study was conducted to evaluate the effects of dietary inclusion of turmeric and cinnamon powders on some immune system parameters of broiler chickens. In a completely randomized design with 6 treatments of 4 replicates each, 240 day old male broiler chicks (ROSS 308) were used. Dietary treatments were as follow: 1) basal diet (control); 2) basal diet + 10 ppm avilamycin (positive control); 3) basal diet + 0.25 % turmeric powder; 4) basal diet + 0.75 % turmeric powder; 5) basal diet + 0.25 % cinnamon powder; 6) basal diet + 0.75 % cinnamon powder. Diets were fed from 1 to 21 d of age. At d 21, two chicks from each replicate were randomly selected and blood samples were collected from wing vein for differential leukocyte count, hematocrit (PCV), and antibody titer against IBV, IBD, and ND vaccines. No difference was seen among treatment groups regarding monocyte and hematocrit percentages ($p>0.05$). However, inclusion of turmeric powder at the levels of 0.25 and 0.75 % of the diet and cinnamon powder at the level of 0.75 % of the diet caused a significant increase in lymphocyte percentage compared to control group ($p\leq 0.05$). Furthermore, turmeric at the level of 0.25 % of the diet significantly decreased heterophile percentage compared to control group ($p\leq 0.05$). Also, heterophile to lymphocyte ratio decreased significantly ($p\leq 0.05$) in groups consuming diets containing 0.25 and 0.75 % turmeric and 0.75 % cinnamon powders comparing to control group. There was no significant difference among treatment groups for antibody titers against IBD and ND vaccines ($p>0.05$). However, 10 ppm avilamycin in the diet caused a significant decrease in antibody titer against IBV vaccine comparing to control group ($p\leq 0.05$).

Heterophile to lymphocyte ratio has been introduced as a reliable index for evaluation of stress in poultry [1]. Different stressors such as scare, hungry, thirst, and overcrowd, can increase the heterophile to lymphocyte ratio in poultry [2]. The reducing effects of both levels of turmeric, and cinnamon at the level of 0.75 % of the diet, on heterophile to lymphocyte ratio, indicates that turmeric and cinnamon powders may be used as stress modulators in poultry nutrition.

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IMPROVED OF YIELD AND YIELD COMPONENTS BY BIOFERTILIZER IN MEDICINAL PLANT FENNEL (*FOENICULUM VULGARE* MILL.)

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Application of biofertilizers in medicinal plants production in sustainable agriculture with aim of remove or reduce the chemical input in order to achieve increased quality and sustainability of yield is very important. The aim of this study was determining the effects of biofertilizers on yield quantification of medicinal plant fennel. The treatments consisted of mycorrhizal inoculation, phosphoric biofertilizer (Barvar 2) and phosphoric fertilizer (0, 50, 100 kg/ha). The experiment was performed as factorial on the base of randomized complete blocks design and three replications. Control included chemical fertilizers (NPK: 90, 60, 90 kg/ha). Results showed that inoculation with Barvar 2 lead to production of 46.48 compound umbel/plant, 0.98 tiller, 21.314 g dry biomass/plant, 1707.72 kg total dry biomass/ha and 5.716% oil yield. Compared between the two mycorrhizal inoculation showed that most compound umbel (51.422) and tiller number (1.040) were achieved by inoculation with *Cebacina vermifera* and lower dry biomass/plant (19.840 g), total dry biomass/ha (1587.23 kg) and weight of thousand seed (4.813 g) were observed under other mycorrhizal treatment. Effect of different levels of phosphorus fertilizer on the measured parameters was also significant. Maximum number of tiller (0.77), yield (314.86 kg/ha), dry biomass/plant (22.485 g), total dry biomass/ha (1798.79 kg) and the essential oil yield (5.91%) was obtained under effect of 100 kg of phosphorus. Interaction effect of phosphorus and Barvar 2 fertilizers was significant on yield, oil yield, seed yield and tiller number. Combination effect of all three fertilizers resulted in the production of 28.784 g dry biomass/plant, 2302.7 kg dry biomass/ha, 8.099 l/ha oil yield, 57.56 compound umbel/plant and 1.600 tiller/p which were greater than that of the control, but the seed yield (535.85 kg) and weight of thousand seed (6.013 g) in control conditions (fertilizer NPK) were greater than that of the treatments.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EXAMINATION OF SOUR CHERRY JUICE EFFECT ON TESTOSTERONE HORMONE IN MEN ADDICTED TO SMOKING CIGARETTES

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Nicotine can cause many of behavioral and neurobiological effects. Smoking can act as a barrier against the treatment of various diseases. Smoking reduces activity of pituitary-gonad axis. This effect can be reduced with usage of antioxidants. Plants are the main sources of antioxidant.

Method of examination is like that 25 volunteers of male employees that addicted to smoking cigarettes were registered and received 300cc concentrated sour cherry juice daily, by 1 to 3 ratio, for one month, and also 25 persons that didn't addict to smoking cigarettes were chosen as a control group. After a month, they were cupped and serum is isolated and examined. For testosterone measurement, direct competitive method of luminance (solid phase) by using Liasian, an automatic apparatus, is employed.

This research showed that drinking 300cc sour cherry juice daily doesn't have any significant change in testosterone hormone secretion. The finding of this study show smoking doesn't affect on testosterone level and these results are in agreement with other study's observation. In additional, sour cherry juice doesn't effect on testosterone level in smoking group [1-9].

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INVESTIGATION OF CARBON SEQUESTRATION OF AVENA SATIVA MEDICINAL PLANT IN RANGES MAZANDARAN

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Carbon is main element of greenhouse gas that in recent decades increasing of it in the atmosphere has been caused earth warming. Warming has devastating effects on live and was caused destruction of natural ecosystem, occurrence of drought, climatic and ecological imbalance. Carbon sequestration in plant biomass and soil under the biomass is most simple and cheapest possible way to reduce levels of this atmospheric gas. This study was performed with aim of assessment of *Avena sativa* carbon sequestration potential. Sampling of vegetation and soil were performed with random- systematic method in 13 plots 0.5×0.5 m² and along 3 transect of 100 meters. For evaluate shooted and rooted organs of *Avena sativa* were performed complete sampling. After drying in oven, carbon sequestration coefficients each of the three plant organs (stems, leaves and root) were determined whit combustion method separately. For data analysis was used one- way ANOVA method, and mean comparisons was used Duncan test. Results showed that the amount of carbon sequestration in different organs had significant difference ($P > 0.05$) and stems and roots had the largest and lowest carbon sequestration potential respectively. Also, the amount of carbon sequestration in plant biomass was 893kg/ ha, which shows the ability of this plant in carbon sequestration and reduce greenhouse gas [1, 2].

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TO INVESTIGATE THE EFFECTIVENESS OF TEA TREE OIL (*MELALEUCA ALTERNIFOLICA*) ON THE TREATMENT OF SEBORRHEIC DERMATITIS

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Seborrheic dermatitis is a chronic inflammatory disorder that occurs in 2-5% of the population. The disease is shown in areas of skin that are rich in sebaceous glands. The symptoms of disease are scaling, redness and itching. Now, an absolute treatment that can improve the disease accelerately with minimal side effects is not available. Tea Tree Oil (TTO) is essence that obtained of "*Melaleuca alternifolia*". It has been traditionally used in the ayurvedic system of medicine for healing burns and infections. The investigations demonstrated that terpenoides in TTO have anti-bacterial, anti-fungal, anti-viral and anti inflammatory effects. Easy access to the TTO, its ease of use and low cost production, makes it the good choice for treatment of Seborrheic dermatitis. The goal of this study is the comparison of TTO effect with placebo on the treatment of seborrheic dermatitis. This study has been designed as double-blinded clinical trial on 42 patients with seborrheic dermatitis. The patients were randomly selected and enrolled in two groups. The groups were treated topically with TTO and placebo gel three times per day for 1 month. After two weeks the remission rate and side effects were assessed in both groups. These finding show that the remission rate in TTO group significantly faster and better than control group ($P < 0.001$). In this period of time no adverse effect was seen. In conclusion the TTO gel was effective in the treatment of seborrheic dermatitis.

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EVALUATION OF THE ACTIVITY OF TWO GARLIC COMPOUNDS (PTS AND PTSO) AND ITS COMERCIAL PREPARATION AGAINST *SALMONELLA ENTERIC* IN LAYING HENS

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Salmonella enterica is involved in many human food borne diseases, being eggs and poultry meat important sources of this pathogen. The aim of this study is to evaluate the antimicrobial activity of two garlic compounds, PTS (Propyl propyl thiosulphonate) and PTSO (Propyl propyl thiosulphonate) and a commercial preparation containing both principles (Garlicon®, Prebia Feed Extracts SL, Spain).

Two experiments were carried out to evaluate the antimicrobial activity of Garlicon® using it at 100 mL/1000 L drinking water during 7 days in 36.000 laying hens or applying it as a nebulizate, using a thermonebulizator machine.

Total *Enterobacteriaceae* and *Salmonella* content dramatically decrease in faeces after the drinking treatment. In the same samples, we found a significant incensement in the counts of *Lactobacilli* and *Bifidobacteria*, showing a different antimicrobial activity in this groups that could lead to a higher number of colonies due to competitive exclusion.

Regarding environmental treatment, all microbial groups studied (Fungi, Total Bacteria and *Enterobacteriaceae*) have a significant decrease in surfaces and air, showing the strong antimicrobial potency of this type of molecules. This results point Garlicon® as a promising tool for poultry farmers, combining efficacy and food safety.

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ASSIGNING THE BEST TREATMENT FOR INCREASING GERMINATION IN *TANACETUM HOLOLEUCUM*

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This study has been conducted to Improvement in germination and seedling growth of (*Tanacetum hololeucum*), on the base of completely randomized design in three replications. Treatments to enhancement germination of *T. hololeucum* included: untreated seed (control), gibberellic acid soaking for 24 hours (500 and 1000 ppm), KNO₃ soaking for 24 hours (0.3%), prechilling (at 4 °C for 4 weeks) and heat (12 hours at 35 °C). Seeds were placed in plastic Petri dishes (25 seeds/petri dish) on top of one sheet of moistened filter paper and placed in a growth chamber. Germination conditions were adjusted as 24°C, 70% humidity, 16 h lighting and 8 h darkness. Measured traits were: germination percentage, radicle length, plumule length of seedlings, mean germination time (MGT), germination rate and seed vigor index. The highest germination percentage (57%) and seed vigor index was obtained in KNO₃ soaking. Results indicated highest radicle length and plumule length obtained under KNO₃ soaking. Results confirmed that germination percentage of *T. hololeucum* at KNO₃ enhanced 61% in comparison with control. KNO₃ has been reported to enhance seed germination possibly through oxidized forms of nitrogen causing a shift in respiratory metabolism to the pentose phosphate pathway [1]. However, it has also been found to substitute the light requirements for germination for many positively photoblastic seeds [2].

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EFFECT OF DROUGHT AND SALINITY STRESS IN SEED GERMINATION OF *TANACETUM KOTSCHYI*

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This research was conducted to determine the effects of salinity and drought stress on germination characteristics and seedling growth of *Tanacetum kotschyi* on the base of two experiments. Seeds were placed in plastic Petri dishes (30 seeds/petri dish) on top of one sheet of moistened filter paper and placed in a growth chamber. Treatments were arranged in a completely randomized design at three replications. Germination conditions were adjusted as 24°C, 70% humidity, 16 h lighting and 8 h darkness. The salinity treatments were 0, 10, 20, 40, 80 and 160 mM. The treatments, for drought stress were six potentials (zero, -3, -6, -9, -12 and -15 bar) of PEG 6000. According to the results, drought and salinity significantly inhibited seed germination of *T. Kotschyian* and the degree of inhibition increased with increasing concentration of drought and salinity. In drought experiments results indicated in -3, -6, -9 and -12 bar germination percentage were reduced 5%, 20%, 25% and 62% respectively. According to results seed vigor index was the most adverse affected trait from drought stress. Results showed drought levels had no significant effects on mean germination time T and germination rate. Ghorbanpour *et al.*, (2011) in his studies has come to similar results [1]. In salinity experiments results indicated in 10, 20, 40 and 80 bar germination percentage was reduced 29%, 30%, 65% and 67% respectively. According to results radical length and plumule length and seed vigor index was the most adverse affected trait from salinity stress. Our results agree with Kaya *et al.* (2003) who observed that higher salt stress index characters resulted in higher resistance to salt stress [2]. In general germination percentage cannot be a good index in screening species, this is because the germination percentage was affected by stress less than results radical length and plumule length and seed vigor index as well it is strongly influenced by the environment in which the seed developed, seed age and storage conditions.

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ANTIOXIDANT PROPERTIES OF VARIOUS EXTRACTS OF *LIGULARIA PERSICA* BOISS. LEAVES

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Ligularia persica Boiss. is an important genus of the Compositae family (tribe Senecioneae). In according to flora Iranica, there is only one species of *Ligularia* in Iran that is endemic to northern Iran [1]. It is well-known that *Ligularia species* are used in traditional medicines such as treatment of coughs, inflammations, jaundice, scarlet fever, rheumatoid arthritis, and hepatic diseases [2]. Up to now, several phytochemical studies have identified the presence of various compounds such as steroids, alkaloids, flavonoids, lignans, sesquiterpenoids, and terpenoids [3]. Antioxidants are vital substances which possess the ability to protect the body from damage caused by free radical induced oxidative stress. There is an increasing interest in natural antioxidants, e.g., polyphenols, present in medicinal and dietary plants, which might help prevent oxidative damage [4, 5]. To our knowledge, there is no report that detail antioxidant activity of various extracts of *Ligularia persica*.

The present study was conducted to analysis antioxidant activity of various extracts of *Ligularia persica* leaves. Water, methanol, ethanol and acetone were used as solvent and antioxidative effects measured by using 2,2-diphenyl-1-picrylhydrazyl (DPPH), reducing power and total antioxidant activity assays. The extracts exhibited total phenolic contents ranging from 4.885 ± 0.02 to 9.275 ± 0.01 mg GAE/g dry matter and total flavonoid contents ranging from 2.130 ± 0.01 to 4.213 ± 0.003 mg QUE/g dry matter. Methanol and ethanol proved to be the most effective solvents for extraction of antioxidants from *L. persica* leaves as they contained the high amount of phenolic (9.27 ± 0.01 mg GAE/g dry matter) and flavonoid (4.21 ± 0.003 mg QUE/g dry matter) compounds. Antioxidant activities of extracts were comparable to ascorbic acid and BHT.

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STEREOSPECIFIC BIOSYNTHESIS OF POLYAMINES AND RELATED GENE EXPRESSIONS OF THE ENZYMES OF THE NICOTINE BIOSYNTHESIS PATHWAY IN TOBACCO

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The stereochemistry of D-amino acids has long been undercover in the subsequent biosynthesis pathways. Up to now, D-amino acids have been considered to have adverse effect of at least no positive effect in the growth and development of plant cells [1]. Here, we present a new finding which shows D-ornithine as a potent exogenous amino acid for the growth and development of tobacco cells [2]. In this investigation, 1, 5 and 10 mM of each enantiomer of ornithine were separately applied to the suspension cultured tobacco. Surprisingly, D-ornithine enhanced the growth of tobacco cells, compared to L-ornithine. Also D-ornithine resulted in higher resistance of the cells against the salinity stress (50 and 100 mM NaCl). The extraction of RNA and PCR analyses were performed for study of the enzymes related to ornithine biosynthesis and plants growth in the stress condition. Interestingly, D-ornithine enhanced the expression of ornithine decarboxylase (ODC) and arginine decarboxylase (ADC) which both are very important in the production of polyamines as the essential molecules for plants normal growth and for its resistance in stress conditions [3]. Also D-ornithine highly enhanced the expression of catalase (CAT) which is an essential enzyme in the accumulation of hydrogen peroxide and preserving the cells against its damage. The findings about these enzymes clearly depict the action of D-ornithine in the growth and resistance of tobacco cells. Alternatively, L-ornithine showed to be the stimulator of putrescine methyltransferase (PMT) expression, the key enzyme of nicotine biosynthesis [4]. Results of this study clearly show that a D-amino acid plays positive role in the expression level of a number of plants important enzymes along with the fact that every enantiomer of the same amino acid plays active role in a different pathway.

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THE EFFECT OF GEOGRAPHICAL ELEVATION ON THE ESSENTIAL OIL CONTENT AND ACTIVE SUBSTANCES OF CHAMOMILE IN SOUTH-WEST IRAN

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In order to determine the effect of elevation from sea level on the essential oil content and its active substances, chamazulene and apigenin 7-glucoside, in chamomile (*Matricaria chamomilla* L.) for selection the best chemotype, an experiment was conducted during 2006-7 in Boushehr province which is located in south-west of Iran. Experimental treatments were arranged in randomized complete blocks design with four replications. Treatments were three natural habitats differed in elevation (0-100, 100-350 and 350-750 m above sea level). In each habitat chamomile plant were harvested at full flowering stage and soil characteristics and climatic parameters were measured. After identification of plant samples, dried flowers were water-distilled in a Clevenger-apparatus based on the standard method of Iran's pharmacopeias (Ph. IR. 1). Amount of chamazulene in the essential oil was determined by spectrophotometrically according to Iran's pharmacopeias, and apigenin 7-glucoside was analyzed using high performance liquid chromatography (HPLC) based on pharmacopeia of the United States (Ph. USP-20). The results indicated to no significant differences between chamomiles of different habitats for all traits (essential oil content, chamazulene and apigenin 7-glucoside percentage). The highest amount of essential oil (0.742%) belonged to the most elevated habitat followed down by decrease in the habitat elevation. Although other traits by decrease in the habitat elevation, were increased; but had no significant difference. Altogether in order to achieve the maximum active substances, reduced production costs and better determination of pharmacologic effects of this plant, selection the most appropriate chemotype of chamomile for each habitat is severely recommended [1-3].

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CHEMICAL COMPOSITION AND ANTIMICROBIAL ACTIVITY OF FEVERFEW (*TANACETUM PARTHENIUM* L.) ESSENTIAL OIL COLLECTED FROM HAMEDAN NATURAL HABITATE

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Feverfew (*Tanacetum parthenium* L.) is a shrub from Asteraceae family that spread all over Iran. This species is a valuable medicinal herb with many therapeutic properties. Recent investigations have shown that feverfew has excellent anti-migraine effect. Overall it has been reported anti-septic, anti-microbial, anti-parasitic and anti-inflammatory properties. However plant samples from different soils and weather conditions may have different kind, amounts and essential oil properties. The main objective of this study was to evaluate the antimicrobial activity of shoot essential oil of feverfew (collected from Hamedan natural habitate) against some microorganisms including gram positive, gram negative bacteria, filamentous fungi and yeast through disc diffusion and micro broth dilution assays.

Plant samples were collected from Hamedan natural habitates in full blooming stage. Shoot essential oil was extracted by hydro-distillation technique using Clevenger apparatus. Anti microbial properties of the plant essential oil were determined using micro broth dilution and well disk diffusion methods.

Results showed that 35 components were identified by GC and GC/MS in the essential oil of feverfew representing 95.8% of total oil. The major components were Camphor (45.0%), Chrysanthenyl acetate (21.5%) and Camphene (9.6%), respectively. Bioassay of essential oil showed that feverfew had strong antimicrobial effects. So that, aerial part essential oil showed the best antifungal activity and this effect is more than the antibacterial activity. Gram negative bacteria were less sensitive than gram positive bacteria. Means average of inhibition diameters of oil against gram positive bacteria and fungi were more than vancomycin and amphotricin B, respectively and this effect was smaller than gentamicin in gram negative bacteria. This property could be resulted from the relatively high amount of Camphor, Chrysanthenyl acetate and Camphene in the essential oil.

Therefore feverfew essential oils possess some compounds with antimicrobial properties, which can be used as antimicrobial agents in new drugs for treatment of infectious diseases. However extension of these findings, their application, processing and recommendation in health service need to be more studied in details.

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DETERMINATION OF FATTY ACIDS IN THE FLORAL NECTAR OF *PEGANUM HARMALA* L.
(ZYGOPHYLLACEAE)

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The floral nectary of *Peganum harmala* produces 2.7±.2 µl of neutral and unscented nectar daily. In order to analysis of free fatty acids, the floral nectar of *P. harmala* was harvested by Hamilton syringe from 15 millimeters buds before pollination and a derivatization-solid phase micro extraction (SPME) technique coupled with gas chromatography-mass spectrometry (GS-MS) was utilized. Four long chain fatty acids: 11-Octadecanoic acid, 16-Octadecanoic acid, 14-Methylpentadecanoic and 16-Methylheptadecanoic acid in a ratio of 15.47%, 12.16%, 9.73% and 5.5% respectively were identified and quantified in the nectar. It seems that the presence of lipids in the floral nectar of *P. harmala* exclusively as an energy source for pollinators is doubted and they may have bioactive properties that remain to be answered.

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EFFECT OF SEED DORMANCY BREAKING TREATMENTS ON GERMINATION AND VIGOR
OF *KELUSSIA ODORATISSIMA*, *BONIUM PERSICUM*, *ECHINACEA PURPUREA* AND
CUMINUM CYMINUM

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Sowing of seed is the first step in domestication of wild species of medicinal plants. Dormancy is the common feature of the seeds of wild types, so breaking of seed dormancy is needed to get economical yield. Seed dormancy breaking treatments can remove the germination inhibitors of the seeds and stimulate the germination.

In order to study the effect of seed dormancy breaking treatments on seed germination and vigor of *Kelussia odoratissima*, *Bonium persicum*, *Cuminum cyminum* and *Echinacea purpurea* which their seeds had been shown dormancy in initial experiments, germination experiment based on completely randomized design was carried out with 10 treatments and four replications. Treatments included of distilled water, KNO₃ 1 and 3 % (soaking over night), PEG -1.5 and -3 bar (soaking over night), GA₃ 500 and 1000 mg/lit (soaking over night), wet chilling (for two weeks), hot water (50°C over night) and scarification (30 second with fine sand). After treatments, 25 seeds from each plant were germinated in a petri dish at sterile conditions for each replication. Germination temperature was 20±1 °c. After 21 days, germination percent and rate, mean germination time and root and shoot dry matter were measured.

Results presented that the best treatments for *Cuminum cyminum* to increase germination rate and percent were two weeks wet chilling and 500 and 1000 ppm GA₃. Two weeks wet chilling and 500 and 1000 ppm GA₃ were the best treatments for *Echinacea purpurea* seed dormancy breaking and seed germination rate. Maximum seed germination for *Bonium persicum* was seen by eight weeks wet chilling and 1000 ppm GA₃. Finally for *Kelussia odoratissima* only 10 weeks chilling could break seed dormancy.

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EFFECT OF DIFFERENT PRIMING ON BLACK CUMIN (*NIGELLA SATIVA* L.) GERMINATION UNDER DIFFERENT LEVELS OF SALT STRESS

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Priming is a technique that the seeds before sowing and exposure to variable environmental conditions, achieve physiological and biochemical fitness to germination. In order to evaluate the effect of different priming on seed germination of black cumin (*Nigella sativa* L.) under different levels of salinity stress, an experiment was carried out in a completely randomized design with three replications at the Seed Technology Laboratory of Yasouj University, Iran, in 2011. Priming treatments were included of 5 levels (1% potassium nitrate and 0.2% salicylic acid at 6 hours, 3% potassium nitrate and 0.5% salicylic acid at 12 hours and hydro priming at 24 hours) and salinity was applied in 4 levels (0, 75, 125 and 175 mM NaCl). The results showed that interaction between salinity and priming of seeds for all traits were significant. On without salinity condition, maximum of germination percentage and rate observed with 3% potassium nitrate application and maximum length of root and shoot, seed vigor and shoot weight by hydro priming application. On 75 mM salinity, 1% potassium nitrate led to higher germination rate and percentage and weight of mobilized seed reserves. Maximum shoot length and seed vigor was related to hydro priming and maximum weight of shoot and mobilized seed reserves to 0.5% salicylic acid. With increasing salt concentration to 125 mM, 3% potassium nitrate improved germination rate, seed vigor and length of shoot and root. Salicylic acid in 0.5% concentration caused to the highest weight of shoot and mobilized seed reserves and 0.2% salicylic acid, led to maximum root weight. At the highest level of salinity stress (175 mM salinity), 3% potassium nitrate showed higher shoot and root length, seed vigor and root weight. Higher germination rate and weight of mobilized seed reserves was related to 0.5% salicylic acid application and 0.2% salicylic acid showed higher germination percentage and shoot weight. Generally until 125 mM salinity, osmopriming by 3% potassium nitrate led to increase of germination characteristics and 0.2% salicylic acid and hydro priming applications, improved seedling growth. But at 175 mM salinity stress, 0.5% and 0.2% salicylic acid increased the germination traits and 3% potassium nitrate improved seedling growth.

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RAPID MICROPROPAGATION OF NEEM (*AZADIRACHTA INDICA*)

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Neem is an important medicinal tree belonging to the family Meliaceae. A method for rapid micropropagation of neem through plant regeneration from leaf and petiole explant derived calli has been developed. The petiole, leaf and stem segments were cultured on MS medium supplemented with the combination of auxins and BA for callus induction. All stem explants on SH medium containing 2 mg l⁻¹ NAA and 0.2 mg l⁻¹ BA produced callus. The highest rate of callus growth was observed with the MS medium supplemented with 0.6 mg l⁻¹ BA and 4 mg l⁻¹ NAA. Shoot regeneration was obtained successfully by using step-by-step method. Firstly, callus was subcultured on MS medium containing 0.2 mg l⁻¹ 2,4-D and then, the calli were transferred to MS medium containing 4 mg l⁻¹ BA, 1 mg l⁻¹ NAA and 0.5 mg l⁻¹ folic acid. In the latter step, some protuberances were appeared on compact calli. These protuberances produced shoots on MS media containing 1 mg l⁻¹ BA and 1 mg l⁻¹ NAA or 1 mg l⁻¹ BA and 2 mg l⁻¹ NAA and 0.4 mg l⁻¹ GA₃. The optimal rooting response was observed on B₅ medium supplemented with 1 mg l⁻¹ NAA, on which 84% of the regenerated shoots developed roots with an average of 16 roots per shoot within 3 weeks. This *in vitro* propagation protocol should be useful for conservation as well as mass propagation of this medicinal plant [1-4].

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SALICYLIC ACID EFFECTS ON MILK THISTLE DEVELOPMENT, SEED YIELD, AND SILYMARIN CONTENT

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An important consideration for milk thistle (*Silybum marianum* L.) cultivation is regulating development to lengthen the reproductive stage and increase seed yield with high silymarin content. The treatment of milk thistle with different concentrations of salicylic acid (0, 10^{-2} , 10^{-4} and 10^{-6} M) showed increase in the proportion of mature flower heads. Highest seed yield, chlorophyll content, photosynthesis, water use efficiency, mesophyll efficiency and highest content of silymarin was found in plants treated with 10^{-6} salicylic acid, whereas in plants treated with high concentrations of SA the total amount of silymarin and seed yield per hectare were decreased [1-3].

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COMPARISON OF THE COMPONENTS PRESENT IN THE ESSENTIAL OILS OF PELARGONIUM ROSEUM FROM VARIOUS CULTURED REGIONS

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Geranium, with the scientific name of *Pelargonium roseum* belongs to the family Geraniaceae. Geraniaceae families of plants are generally, one year or two, more or less covered with wool, and rarely woody and fragile stems. Also in this particular family, genus *Pelargonium* leaves when rubbed produces a fine smell due to its essential oil [1]. Geranium with antidepressant activity is used for its wound healing properties as well [2]. Given the possibility of cultivation of geranium in different parts of Iran, samples of aerial parts of geranium were prepared from regions of Kashan, Noorabad, Dezful, and Noshahr. After the hydrodistillation extraction of essential oil, and Determining the oil yield. Oils were separately subjected to analysis by gas chromatography (GC) and gas chromatography connected to mass spectrometer (GC/MS) in order to identify the components and compared with one another that mainly included: Geraniol, Citronellol, Linalool, and Borneol, Terpineol, and Phenyl ethyl alcohol. The percentage amount of geranium oil from Noshahr, Kashan, Noorabad and Dezful regions were 0.23, 0.13, 0.25 and 0.22. Composition of the Citronellol, and Geraniol in the four regions reported as 34.4, 48.6, 32.9, 18.5, 17.7, 5.86, 14.85 and 11.8 percent respectively.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



DIFFERENT ANTI AMYLOIDOGENIC AFFECTS OF TWO ESSENTIAL OILS' COMPOUNDS, CUMINALDEHYDE AND ALPHA-TERPINEOL, ON FIBRIL FORMATION OF TWO AMYLOIDOGENIC PROTEINS

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Nowadays, there is an enormous effort to find the best way to treat and control the symptoms of neurodegenerative diseases due to their occurrence fast on the world. In these cases, the amyloidogenic proteins assemble as extensive plaques in the outside or inside of the brain cells. Small molecules are the compounds which have potential aptitude to protect the proteins toward self-assembly and formation of the dangerous and cytotoxic particles such as oligomers and prefibrils. This research work was focused on inhibitory effects of two important compounds of essential oils, cuminaldehyde and alpha-terpineol, on the fibrillation pathway of alpha-synuclein as a prime candidate for Parkinson and other synucleopathy diseases. We also examined their effects on fibril formation of lysozyme. According to standard methods which use to assay fibril formation e.g. ThT fluorescence, Congo red absorbance, AFM, and fluorescence images, it was verified that these compounds had opposite influences on the proteins fibrillation. Cuminaldehyde inhibited α -synuclein fibrillation strongly in a concentration-dependent manner. The best inhibition was obtained when 3 or 4 moles of cuminaldehyde was added to one mole of the protein in the solution. After fibrillation process (incubated in 37°C, fixed agitation and pH 7.2) untreated protein solution caused cell viability fell down more than 50% but treated samples with cuminaldehyde did not kill cells obviously (up to 90% viability was observed). In contrast cuminaldehyde induced fibrillation in lysozyme. Astonishingly adding alpha-terpineol had opposite effect on amyloid fibril formation of α -synuclein and lysozyme. In the presence of α -Terpineol, there was a moderate inhibition on the lysozyme fibril formation. However, it could induce fibril formation in alpha-synuclein monomers about 40% rather than control samples. These observations can warn scientists to use essential oils as a source of small molecules because they contain wide variety of small molecules. Our study showed that even though the structure of small molecules can be alike, their properties as fibrillation inhibitors might be specific for the different amyloidogenic proteins.

THE EFFECTS OF BIO FERTILIZERS AND CHEMICAL PHOSPHOROUS FERTILIZERS ON QUANTITY AND QUALITY YIELD OF JOHN' SWORT (*HYPERICUMPERFORATUM*)

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In order to study the effects of bio-fertilizer on quantity and quality of John'swort, an experiment was conducted at in Shahed university in 2010. The factors were phosphatic bio- fertilizer (inoculated and non-inoculated), phosphorous fertilizer in 3 levels (0, 100, 200 kg/h) and vermin- compost (0, 5, 10 ton/h). The experiment design was factorial experiment in the base of randomized complete blocks design with eighteen treatments and three replications. In addition, one plot was allocated to control in each replication and only chemical fertilizers (NPK: 250, 200 and 100 kg/h) were used. Data obtained from control plots were used for comparing other plots. Results showed that the highest plant height, biological yield, hypericin yield and flowering shoot yield (kg/h) were obtained from vermin-compost (5 ton/ha). Between 5 and 10 ton/ha vermin-compost were not significantly Variance and harvest index were not significantly affected due to vermin-compost. Interactions of two factors of phosphatic bio-fertilizer inoculation and phosphorous fertilizer were significant. Results showed that the maximum plant height, flowering shoot yield, biological yield and hypericin yield were obtained by applying 100 kg/ha P₂O₅ plus phosphatic bio-fertilizer. Comparison of control versus bio-fertilizer treatments was significant. Maximum flowering shoot yield, biological yield and hypericin yield was obtained by 5 ton/ha vermicompost with 200 kg/ha P₂O₅ and phosphatic biofertilizer non-inoculated. Flowering shoot yield, biological yield and hypericin yield in this treatment were higher than that of control. It seems that bio-fertilizers can consider as a replacement for chemical fertilizers in chamomile medicinal plant production.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECTS OF CORM DENSITY AND CORM WEIGHT ON GROWTH CHARACTERISTICS, FLOWERING AND ECONOMIC YIELD OF SAFFRON (*CROCUS SATIVUS*)

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Saffron is a cash crop that most of researchers believe it is indigenous crop of Iran [1]. In order to study the effects of corm density and corm weight on growth characteristic, flowering and economic yield of saffron (*Crocus sativus*), a field experiment was conducted as factorial based on randomized complete block design with three replications, during 2009 and 2010 at the Agricultural Research Station, College of Agriculture, Ferdowsi University of Mashhad, Iran. Three corm weights (2-4, 4-8 and 8-10 g) and three corm density (50, 100 and 150 corm per m²) were allocated to the first and the second factors, respectively. Results indicated that the simple effects of corm density and corm weight on leaf and corm cover dry weight, leaf length, numbers, diameter and weight of daughter corm, numbers of flowers, flower fresh weight and economical yield of saffron were significant ($p \leq 0.05$). Also, the interaction effects between corm density and corm weight were significant on the weight of daughter corm. With increasing corm density, the growth characteristics and economical yield of saffron were decreased. The maximum and the minimum economical yield of saffron were observed in corm density with 50 corms per m² (0.88 Kg/ha) and 150 corms per m² (0.47 Kg/ha), respectively. Also, the highest and the lowest saffron economical yield were observed in the corm weight with 8-10g (0.98 t/ha) and corm weight with 2-4g (0.39 t/ha), respectively. Therefore, it seems that the determination of appropriate levels of corm weight and corm density increased the flower number and economical yield. Therefore, it seems that the determination of appropriate levels of corm weight and corm density increased the flower number and economical yield [2,3].

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ANTIBACTERIAL ACTIVITY OF DIFFERENT PARTS OF *PHONIX DACTYFERA*

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In many parts of the world there is a rich tradition in the use of herbal medicine for the treatment of many infectious diseases. Because of the side effects and the resistance that pathogenic microorganisms build against the antibiotics, much recent attention has been paid to extracts and biologically active compounds isolated from plant species used in herbal medicine. In this study different parts of *Phonix dactyfera* from Kerman-Bam region were collected.

Plant samples were dried in shade and extracted with methanol, chloroform and aqueous by maceration method for 10 days in room temperature. The extracts were filtered and the solvent was removed by rotary evaporation. Proper concentration (40 mg/ml) from each extract in DMSO: Methanol was prepared. Microorganisms (five gram negative bacteria and 3 gram positive bacteria) were cultured on brain heart infusion agar and antibacterial activity tested by agar well diffusion assay. As a precaution for not missing any trace amounts of antimicrobials, a relatively high concentration of 40 mg/ml of each extract was prepared in dimethyl sulfoxide: methanol (1:1, v/v) solvent and administered to fullness in each well. Cultured plates were incubated at 35°C. After 48h bioactivity was determined by the measurement of the diameter of inhibition zones (DIZ) in mm. Finally MIC and MBC was determined.

Some extracts showed antibacterial activity against some bacteria and methanolic extract of palm kernel was the best. In gram positive bacteria, *Staphylococcus aureus* (PTCC 1112) and in the gram negative bacteria *Escherichia coli* (PTCC 1330) were the most sensitive bacteria. MIC and MBC value were 1.25 and 2.5 mg/ml respectively.

According to the results, it is suggested that different parts of *Phonix dactyfera* with antibacterial substances can use in treatment of infections especially gram positive one. Efforts should go on to screen more local flora in different regions, because many investigations have shown that environment is very effective in biological properties in plants [1].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EVALUATION OF RADIATION ABSORPTION AND USE EFFICIENCY IN ROW INTERCROPPING OF BORAGE (*BORAGO OFFICINALIS* L.) AND BEAN (*PHASEOLUS VULGARIS* L.)

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Plant dry matter accumulation has a linear relation with accumulative Photosynthetically Active Radiation (PAR) [1, 2]. Intercropping could be a strategy for increasing light absorption in agronomic systems and it may improve radiation use efficiency (RUE). Based on this purpose the present field study was conducted to evaluation radiation absorption and use efficiency in bean (*Phaseolus vulgaris* L.) and borage (*Borago officinalis* L.) strip intercropping at the farm of the Faculty of Agriculture, Ferdowsi University of Mashhad, Iran at 2010. Treatments included one row of bean + one row of borage (1:1), two rows of bean + two rows of borage (2:2), three rows of bean + three rows of borage (3:3), four rows of bean + four rows of borage (4:4) and pure bean and borage. Results indicated that leaf area index, light absorption, total dry matter and radiation use efficiency of bean and borage increased in all intercropping treatments in comparison with sole cropping. Both intercropping complementary effects was more on bean than borage in the measured traits. Mean of bean RUE in growing season was from 0.99 g.MJ⁻¹ in the sole to 1.27 g.MJ⁻¹ in two rows of bean + two rows of borage. Mean of borage RUE was from 0.98 g.MJ⁻¹ in the sole to 1.11 g.MJ⁻¹ in two rows of bean + two rows of borage treatment. The highest Leaf area index (LAI) in bean was obtained in two rows of bean + two rows of borage (4.3) .

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EFFECTS OF SOME MEDICINAL PLANT EXTRACTS AGAINST ROOT-KNOT NEMATODE ON TOMATO

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Natural products provide a safe alternative method for plant parasitic nematodes control. Numerous plant extracts have been reported to contain antineematode resources. The beneficial effects of certain types of plant derived materials in soil have been attributed to a decrease in the population densities of plant-parasitic nematodes [1]. Root-knot nematode (*Meloidogyne* spp.) infestations on tomato (*Solanum lycopersicum*) are common in Iran and worldwide and cause severe crop damage. Management of these nematodes with biological control agents has been receiving growing consideration [2]. Four medicinal plant extracts including *Mentha spicata* (spearmint), *Allium sativum* (garlic), *Ricinus communis* (castor bean) and *Syzygium aromaticum* (clove) were investigated against *Meloidogyne javanica* on tomato under *in vitro* and pots conditions. Experiments were conducted to compare the performance of extracts with that of the Fenamiphos (Nemacur™) as a nematicide in complete randomize design. Final nematode population (juveniles in soil, females and eggs in root) and number of galls and rate of buildup of root-knot nematode were determined. Growth parameters (plant height, fresh and dry weights of shoots (stems + leaves) /plant) were also recorded.

All treatments decreased nematode development parameters compared to the untreated control. Results showed that fresh and dry weight of shoots were higher ($P \leq 0.05$) in nematode free plants than both *M. javanica* infested plants and the above mentioned treatments. In laboratory assays extracts from clove, castor bean, garlic and spearmint were most effective in controlling the nematode. In greenhouse bioassay, both *Syzygium aromaticum* and *Allium sativum* were the most effective treatments in decreasing the final nematode population in soil and roots, number of galls and rate of buildup of root-knot nematode. Also, they recorded the maximum plant growth parameters. While, the least effective one was *Mentha spicata*. Observation revealed that the roots systems of treated plants were more dense and paler in color than those from the untreated plants, which had dark brown roots. Among the plant species, clove demonstrated best control reducing root galls by 61% in pots under greenhouse conditions and increasing average plant growth by 42%. Results suggest that plant extracts could be considered as management option to reduce the population of root-knot nematode *M. javanica*. Effectiveness of these products warrants further study, however, including using different combinations of materials and timing of application, aiming to determine if they are useful as part of integrated nematode management.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF GROWTH REGULATORS AND CORM SIZE ON VEGETATIVE TRAITS OF SAFFRON (*CROCUS SATIVUS* L.)

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Saffron (*Crocus sativus* L.) is a valuable **medicinal** plant which has many therapeutic applications since long time ago as anti-spasmodic, carminative, and diaphoretic. The objective of this research was to investigate the effects of growth regulators and corm size on vegetative traits of saffron. The experiment design was arranged in a factorial in basis of randomized complete block design with three replications and two treatments. The first treatment was corm size with three levels of corm weight (2-4gr, 6-8 and 10-12gr). The second treatment was growth regulators treatments (cytokinins, auxin and gibberellin) were applied to corm before planting, while in controls plant the corms were treated only with water or planted without any treatment. The result showed the effects of corm size and growth regulators on vegetative traits of saffron were significant. The leaf number, leaf length, flower number, the number of flower per plant, flower weight and stigma weight were increased significantly by gibberellin and auxin treatments compare to control. Cytokinins treatment significantly increased the number of leaf per plant but decreased the length of leaf. Large corms, produced plants with more leaf number, leaf length and higher germination speed than the small corms.

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INTERACTION OF SILICON AND SALINITY ON ANATOMICAL AND MORPHOLOGICAL CHANGES IN *BORAGO OFFICINALIS* L. LEAF

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In order to meet the ever-increasing demand of medicinal plants, for pharmaceutical industry, some medicinal plants need to be cultivated commercially, but the soil salinity and other forms of pollutions cause serious threats to plant production. Salinity affects many physiological and morphological processes of plant. Silicon has beneficial effects on many crops, mainly under biotic and abiotic stresses. Silicon can affect biochemical, physiological, and anatomical changes and, consequently, alleviates salt stress. However, the effects of Si on Borage plants under salt stress are still unknown. The aim of this study was to investigate the effect of Si supply on anatomical changes of leaf epidermis of *Borago officinalis* L. either exposed or not exposed to salt stress. The morphology, trichome density and trichome length, also stomatal density and length and width of stomata in adaxial and abaxial leaf surfaces were examined by means of light microscopy. Salt stress results in significant modification affecting trichome distribution and size on both sides of leaf. In addition, a significant decrease of stomatal area was observed. However, Silicon mitigated the affect of salinity on borage anatomy.



DETERMINATION OF ROSMARINIC ACID IN LEAVES OF SOME IRANIAN *SALVIA* SPECIES BY A RAPID SPECTROPHOTOMETRIC METHOD

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Rosmarinic acid is a biologically active phenolic compound, which commonly found in species of the Boraginaceae and Lamiaceae. The majority of the phenolic acids in *Salvia* species (Lamiaceae) are almost as caffeic acid derivatives, which occur predominantly in the dimer form of rosmarinic acid. Rosmarinic acid is the most abundant and powerful natural antioxidant in various important Lamiaceae species. The antioxidant activity of rosmarinic acid is stronger than that of vitamin E. Anti-inflammatory, antiviral, and antimicrobial properties of rosmarinic acid have also been reported. Rosmarinic acid prevents cells from damage caused by free radicals, thereby reduces the risk of cancer and atherosclerosis. A total of 58 *Salvia* taxa at the specific level were reported to be present in Iran. To the best of our knowledge, among Iranian native *Salvia* species, only *S. limbata* has been studied for the presence of rosmarinic. The objective of this paper was determination of rosmarinic acid content in the leaves of some populations of eight *Salvia* species from Iran by a novel spectrophotometric method. The dried and powdered leaves of *Salvia* species were separately extracted with methanol. Methanol extracts solutions of samples were freshly prepared in 96% EtOH prior to measurement. Ethanolic extract of each sample was added to zirconium (IV) oxide chloride solution. This method was based on the complexation of rosmarinic acid with Zr^{4+} ions, giving a maximum absorbance at 362 nm. The content of rosmarinic acid in the leaf extracts were calculated according to the equation that was obtained from the standard rosmarinic acid graph. Based on our results, three populations of *S. limbata* (23.12 ± 0.92 , 21.26 ± 0.2 and 18.76 ± 0.55 mg/g dry weight) had the highest contents of rosmarinic acid, followed by *S. nemorosa* (17.28 ± 0.58 mg/g dry weight) and *S. reuterana* (15.66 ± 0.14 mg/g dry weight), while *S. sclarea* (4.84 ± 0.28 mg/g dry weight) showed the lowest content. In conclusion, among the *Salvia* species studied in the present work, *S. Limbata*, *S. nemorosa* and *S. reuterana* with considerable contents (higher than *S. officinalis* with 13.42 ± 0.83 mg/g dry weight) of rosmarinic acid, appear to be potential new sources of this valuable phenolic compound.

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COMPOSITION OF THE ESSENTIAL OIL OF *HYPERICUM PERFORATUM* L. FROM NORTH PART OF IRAN

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St John's wort (*Hypericum perforatum* L.) is the most important medicinal species of the genus *Hypericum*. The plant is well known for its antidepressant activity and has been shown to contain a wide range of secondary metabolites, in particular naphthodianthrones, acylphloroglucinols, flavonoids and essential oil. The present study was aimed to investigate volatile constituents of St John's wort plants growing wild in the north part of the country (Javaherdeh Village, Mazandaran province). To do this, shoots including flowers were subjected to hydrodistillation and then obtained essential oil was analyzed by means of GC and GC-MS. In total forty-seven components were identified, representing about 95.71% of oil composition. α -Pinene (21.88%) was found to be the most abundant compound, followed by Nonane (9.77%), *n*-Octane (9.13%) and Dodecanol (6.80%).

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



A PLAUSIBLE RELATIONSHIP BETWEEN D-ORNITHINE AND RESISTANCE TO SALT STRESS IN TOBACCO (NICOTIANA TABACUM L. CV. BURLEY 21)

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Tobacco (*Nicotiana tabacum* L.) is a medicinal plant which 0.3% - 5% of its dry weight is composed of nicotine, one of the most studied of all drugs. The plant is very sensitive to environmental stresses. Salinity is one of the major factor limiting plant development and crop productivity. This stress is associated with damage at the cellular level inflicted by accumulation of reactive oxygen species (ROS), in particular H₂O₂. Application of certain amino acid enantiomers has been recently introduced as a potent method to increase plant resistance against environmental stresses. The present study was undertaken to evaluate the effects of 1 mM Ornithine on the growth and H₂O₂ content of suspension-cultured tobacco cells (*Nicotiana tabacum* L. cv. Burley 21) under stress of 50 mM NaCl. The results showed decrease of fresh biomass and increase of H₂O₂ content of the cells under saline conditions. Treatment with D-ornithine however, restored biomass production of the cells and decreased their hydrogen peroxide content. Therefore, D-ornithine can be introduced as a promising candidate to increase the resistance of tobacco plants against salinity and probably other similar stresses which are accompanied by oxidative burst.

EFFECT OF CYNARA SCOLYMUS ON BROILER CHICKENS WHITE BLOOD CELLS COUNT AND HETEROPHIL TO LYMPHOCYTE RATIO UNDER HEAT STRESS CONDITION

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The encouragement of poultry immune system by medicinal plant products is becoming an important scientific subject. Artichoke (*Cynara scolymus* L.), is native to the Mediterranean area which its leaves traditionally have been used by the Eclectic physicians as a diuretic and depurative, for the treatment of rheumatism, jaundice and also to process hepatoprotective and antioxidative [1]. To date, no data is available on the effects of artichoke on poultry white blood cells (WBC) count and heterophil to lymphocyte (H/L) ratio under stressful condition. Hence, the purposes of this research were to evaluate the effect of *Cynara scolymus* on broiler white blood cells and heterophil to lymphocyte ratio under heat stress condition.

160 day-old broiler chicks (Ross, 308) were randomly assigned into four dietary treatments with four replicate pens per treatment (10 birds/pen) in a completely randomized design (CRD) with a 2x4 factorial arrangement (4 treatment diet and 2 different temperatures rearing system). Treatment diets were: 1) control diet; 2 and 3) basal diets were supplemented with 2 levels of artichoke (1.5 and 3 gr/100gr diet) and 4) basal diet was supplemented with 30 mg/100gr diet vitamin E. From d 35 to 42, half of the broiler chickens were exposed to cyclic-heat stress (34±1°C and 75%RH, 6hr/d, 10.00–16.00 h) by increasing the poultry house temperature. Diets were fed from d 1 to 42 with *ad libitum* access and all the birds were reared under continuous lighting. On d 42, four birds from each treatment were bled randomly in tubes containing EDTA for determination of WBC count by a hemocytometer method and H/L ratio as described by Zulkifli *et al.* (2000).

Results showed that WBC count and H/L ratio were not influenced by treatments and heat stress interaction (P>0.05). However, birds fed control diet under heat stress condition had significantly higher H/L ratio and lower WBC count than broilers of control group were reared under normal temperature condition (P<0.05). There were no significant differences between the other treatments in heated and unheated broiler chickens (P>0.05). Therefore, it can be concluded that artichoke might be a useful alternative for synthetic antioxidants.

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EFFECT OF *CYNARA SCOLYMUS* ON BROILER CHICKENS WHITE BLOOD CELLS COUNT AND HETEROPHIL TO LYMPHOCYTE RATIO UNDER HEAT STRESS CONDITION

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The encouragement of poultry immune system by medicinal plant products is becoming an important scientific subject. Artichoke (*Cynara scolymus* L.), is native to the Mediterranean area which its leaves traditionally have been used by the Eclectic physicians as a diuretic and depurative, for the treatment of rheumatism, jaundice and also to process hepatoprotective and antioxidative [1]. To date, no data is available on the effects of artichoke on poultry white blood cells (WBC) count and heterophil to lymphocyte (H/L) ratio under stressful condition. Hence, the purposes of this research were to evaluate the effect of *Cynara scolymus* on broiler white blood cells and heterophil to lymphocyte ratio under heat stress condition.

160 day-old broiler chicks (Ross, 308) were randomly assigned into four dietary treatments with four replicate pens per treatment (10 birds/pen) in a completely randomized design (CRD) with a 2x4 factorial arrangement (4 treatment diet and 2 different temperatures rearing system). Treatment diets were: 1) control diet; 2 and 3) basal diets were supplemented with 2 levels of artichoke (1.5 and 3 gr/100gr diet) and 4) basal diet was supplemented with 30 mg/100gr diet vitamin E. From d 35 to 42, half of the broiler chickens were exposed to cyclic-heat stress (34±1°C and 75%RH, 6hr/d, 10.00–16.00 h) by increasing the poultry house temperature. Diets were fed from d 1 to 42 with *ad libitum* access and all the birds were reared under continuous lighting. On d 42, four birds from each treatment were bled randomly in tubes containing EDTA for determination of WBC count by a hemocytometer method and H/L ratio as described by Zulkifli *et al.*, (2000).

Results showed that WBC count and H/L ratio were not influenced by treatments and heat stress interaction (P>0.05). However, birds fed control diet under heat stress condition had significantly higher H/L ratio and lower WBC count than broilers of control group were reared under normal temperature condition (P<0.05). There were no significant differences between the other treatments in heated and unheated broiler chickens (P>0.05). Therefore, it can be concluded that artichoke might be a useful alternative for synthetic antioxidants.

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GERANIOL ENVIRONMENTALLY OXIDATION WITH HYDROGEN PEROXIDE USING NANO MOLIBDENIUM OXIDES-SBA-15 CATALYST

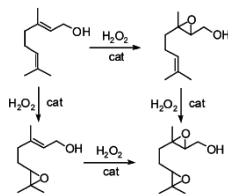
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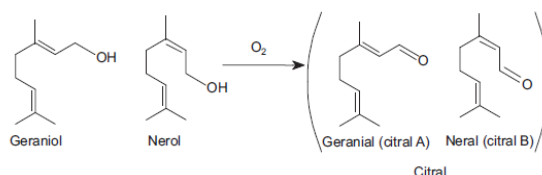
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Geraniol is a natural alcohol, available monoterpene from essential oil of some plants such as orange and lemon that used in pharmaceutical, cosmetic and food industrial. This allylic alcohol has an attractive oxidation reaction due to several possible sites of oxidative attack. Therefore different oxidation condition can produce various results. Use of nanocatalysts such as Fe-silica nano particles-H₂O₂, W-silica-H₂O₂ produce epoxide in good yields due to olephine C=C bond oxidation the same as scheme1. So catalysts such as Ru-NMO-Molecular Oxygen, Pd nanoparticles-dense CO₂, and Molecular Oxygen in dense CO₂ produce citral due to C-OH band oxidation the same as scheme2. We report geraniol Oxidation with MoO₃-SBA-15 nano particles as a heterogenous nanocatalyst in H₂O₂ and different conditions. This oxidation is eco-friendly. This nano Catalyst is reusable and H₂O₂ is cheap and environmentally clean and easy to handle but it is poorly active without any catalyst. Identity of reaction products was also confirmed by GC-MS. Results have shown formation of corresponding 2,3-epoxide. Selectivity and conversion are flexible in different temperature and time of reaction.



Scheme 1



Scheme 2



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



A COMPARATIVE STUDY ON THE EFFECTS OF EMF AND SMF ON THE FERRITIN, IRON AND CALCIUM CONTENT OF WHEAT SEEDLINGS

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Effect of static magnetic field (SMF) and alternative electromagnetic field (EMF) on plants have been investigated for more than three decades, but the exact mechanism of these effects is poorly understood. Ferritin is a large protein that store iron in many animals and plants, so it plays critical roles in development and under stress conditions due to its ability to buffer iron fluxes. Ferritin also serves as an important component to protect plastids against Fe-mediated oxidative stress. Among all mechanisms of magnetoreception by living organisms, an influence on Calcium, which is crucial for many life processes, is in the focus of interest. The effect of these fields on the biological systems and their application in the improvement of some disease were evident. However, there is no adequate literature on the application of these fields in order to development of strategic plants. In this study the comparative effect of SMF and EMF on the some physiological parameters of wheat seedlings were investigated. The seeds of wheat (*Triticum aestivum* L.) after sterilization and imbibing were treated with SMF (30mT) and EMF (10KHz) for 4 days and 5 hour for a day. After treatment the content of ferritin, iron and calcium were estimated. The results showed that treatment with EMF and SMF did not cause any significant changes in the ferritin concentration of wheat seedlings, but the iron content of the MF-pre-treated plants was significantly higher than that of control plants. The measurement of the calcium content in all groups of wheat plants showed that, the content of calcium in EMF-treated plants was significantly higher than that of non-treated plants, however in SMF-treated plants this content was significantly lower than that of control plants. This adverse bio-effects of the magnetic fields are usually mediated by oxidative stress, possibly due to either the direct production of reactive oxygen species via the Fenton reaction or by an increase of their longevity due to a reduction in the level of antioxidant enzymes.

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TREATMENT OF FERTILITY DISORDERS IN PERSIAN TRADITIONAL MEDICINE REFERENCE BOOKS

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It is known that between 8% and 12% of couples around the world have difficulty conceiving a child at some point in their lives. Modern therapies are expensive and depend on sophisticated instrumentations and equipments. Although the etiology and treatment of fertility disorders in "Persian Traditional Medicine" is different from that of modern medicine, the use of therapeutics (medicine) is a common base for treatment in both modern and traditional approaches. Studying the contents of traditional drugs can lead to producing novel drugs and methods for treatment of infertility disorders. Traditional drugs are cheaper and less expensive than the technological based modern drugs.

The Four "Persian Traditional Medicine" books reviewed for finding drugs effective for treatment of infertility disorders, fertility dysfunction and other genital diseases in men and women are:

Makhzan-Al-Advieh : Author; Mohammad hasan Aghili Khorasani 18th century A.D

Alghanoon-fi-alteb : Author; HoseinIbn-e Abdullah Sina (Avicenna) 9-10th century A.D

Alhavi : Author; Mohammad ZakaryaRazi (Rhazes) 9th century A.D

Alekhtyarat e badiei : Author; Ali Ibn-e Hosein Ansari 14th century A.D

The drugs used in "Persian Traditional Medicine" approach for health treatment are categorized in three groups: 1. Mineral derived drugs 2. Herbal derived drugs 3. Animal derived drugs. In the books reviewed in this study, 400 mineral, herbal and animal drugs were found for treatment of fertility disorders including 324 herbal derived drugs, 47 mineral derived drugs and 75 Animal derived drugs. The large amount of drugs effective for treatment of infertility disorders in the "Persian Traditional Medicine" approach for fertility disorders treatment is of great importance. The effectiveness of some of these drugs has been proven by recent studies. Investigations of many of the drugs found in our reviews of these four books could potentially be the topics for new laboratory and clinical studies.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE INTERACTION OF DIFFERENT LEVELS OF PHOSPHORUS FERTILIZERS AND VERMICOMPOST ON YIELD COMPONENT OF CORIANDER

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To evaluate the different levels of phosphorus fertilizer and biological vermicompost on plant performance in 2011 in the climate zone Qaemshahr City, the experiment design was factorial experiment in the base of randomized complete blocks design with four replications predominantly in planting pots to be implemented. Phosphate fertilizer Triple Super phosphate treatments included four levels of 0, 10, 15 and 20 mg/kg of soil and vermicompost fertilizer treatments was included four levels of 0, 25, 50 and 75 percent weight soil in the pot. Six seeds in the depth of 2 to 3 cm were planted and after the emergence of one healthy plant were kept. Results showed vermicompost and phosphorus fertilizer treatment were increased significantly seed weight, seed yield, compared to control treatment (non fertilizer). Result showed that highest umbel no./plant(7.2), 1000 seed weight (6.9 g), seed yield per plant (3.84 g/plant), number seed per umbel (13) were obtained through use 20 mg/kg Super phosphate fertilizer. Vermicompost fertilizer also showed that the highest 1000 seed weight, seed yield per plant, number umbel per plant, number seed per umbel were obtained through use 75 percent weight soil of vermicompost fertilizer.

EFFECT OF NITROGEN FERTILIZER AND PLANT DENSITY ON SEED YIELD , HAY YIELD , DEGREE PRODUCTIVITY AND A FEW QUANTITATIVE CHARACTERISTICS OF CORIANDER IN THE ALESHTAR REGIN

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In order to study the effect of nitrogen levels and plant density on hay yield , degree productivity and a few quantitative characteristics of Coriander in the Aleshtar regin, an experiment was conducted in Aleshtar region in 2010. The experiment was laid out by split plot design with four replications, main plots were urea levels: 0 ,50, 100 and 150 kg/ha and subplots were plant density including: 20, 30, 40 and 50 plant/m². Hay yield, morphological characteristics, and degree production seed yield, umbel number per plant, fruits per umbel, 1000 fruit weight were determined. Results showed nitrogen and plant density effected on hay yield, degree productivity and plant height with increasing of nitrogen to 150 kg/ha, there was significant increase degree productivity. The number of branch per plant was increased with more nitrogen. But the highest plant height was obtained with 100 kg/ha nitrogen. With increasing of plant density, plant height increased and number branch per plant decreased. The highest hay yield (2406 kg/ha) was obtained in 40 plant/m², while degree productivity (64.7) was highest in 50 plant/m². Results showed nitrogen and plant density effected on Seed yield. With increasing of nitrogen to 100 kg/ha, there was a significant increase in seed yield. The seed yield was decreased with more nitrogen. But the highest 1000 fruit weight (12.1) were obtained with 150 kg/ha nitrogen. With increasing of plant density, seed yield per plant had a significant decrease. The highest Seed yield (2879 kg/ha) was obtained in 50 plant/m², while highest umbel number per plant was obtained in 20 plant/m² that there was no difference with 30 plant/m² in this respect. Comparing of treatments showed that the highest seed yield was obtained by using 100 kg nitrogen/ha with 50 plant/m².



ANTIOXIDANT ACTIVITY OF *ECHINACEA PURPUREA* EXTRACT IN KOLOMPEH

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Much research has been made on the antioxidant activity of natural products such as herbal extracts. In this study, the antioxidant effect of echinacea extract (*Echinacea purpurea* L.) at 0.25, 0.5 and 0.75% in Kolompeh (traditional cookie of Kerman) were investigated and compared with samples containing 100 and 200 ppm BHA and control sample (without any antioxidants). Results showed that the lowest concentration had the highest antioxidant effect and pro-oxidant effects were appeared with increasing in concentration of the extract. In general we concluded that echinacea extract can act as a natural antioxidant compound and can increase shelf life of Kolompeh [1-10].

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INFLUENCE OF SALICYLIC ACID SPRAY ON IMPROVES THE SEEDLING GROWTH IN MEDICINAL PUMPKIN UNDER SALT STRESS

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Salicylic acid (SA), an important plant hormone, has been recognized as a critical signal in local defenses and in systemic acquired resistance (SAR) [1].

The present study was undertaken to investigation of effect of SA acid on growth characteristics of medicinal pumpkins seedling (*cucurbitapepo* var *styriaca*) under salt stress. For this purpose a experiment based on completely randomized design was conducted with fore levels salinity (0, 50, 100, and 150 mM), and fore levels of SA acid (0, 0.5, 1, and 1.5 mM) with three replications. It was found that the SA treatment Caused increased the shoot and root length, %DMshoot and root, chlorophyll content, leaf area and number of leaves in compared to control. Rising in salinity concentration caused the decreased the chlorophyll content, leaf area, %DM leaf and stem length/root ratio, but seedling growth characteristics was obtain in SA acid at (1.5 mM). It was expected salinity increased stomatal resistance. Application of SA acid caused moderating effect of salinity on the medicinal pumpkins seedling.

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ALLELOPATHIC EFFECT OF HYDROALCOHOLIC EXTRACT OF NETTLE (*URTICA DIOICA* L.) ON GERMINATION AND SEEDLING GROWTH OF FOUR WEEDS

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Irregularly consume of herbicide against weeds caused environmental pollution. Although producing of chemical herbicides cost so much every year, using of herbal herbicides prevent from damaging of human existence and so economical. So using the allelopathic use of herbal has a good potential for controlling against of weeds as herbicides. So this research has been conducted to study the allelopathic effect of *U. dioica* hydroalcoholic extract on germination and growth of pig weed (*Amaranthus retroflexus* L.), oat (*Avena fatua* L.), green foxtail (*Setaria viridis* L.) and fat hen (*Chenopodium album* L.) in laboratory and greenhouse. Treatment of *U. dioica* extract minded in 6 percent of concentrations that included 0.1, 0.25, 0.5, 1, 2.5 and 5 and distilled water as control. According to results in laboratory, various concentrations had significant reduction in germination percentage, radical and plumule lengths. In greenhouse, reduction in percentage of seedling emergence, height, fresh and dry weight of weeds has observed. Results confirmed that extracts had no effect on germination rate of weeds in laboratory and greenhouse. In greenhouse at 1% concentration of *U. dioica* germination of *A. Retroflexus*, *A. fatua*, *S. viridis* and *C. Album* has reduced, 77%, 43.34%, 57.33% and 60% respectively in comparison with control and 5% and 2.5% extracts have inhibited germination of *A. retroflexus* and *A. fatua*. In laboratory germination of all weeds, has inhibited with upper than 1% extracts. Many researches revealed that glycosides and phenols are important allelopathic compounds [1] and there are some reports that seed and root of *U. dioica* showed the presence of large amounts of terpenoids and alkaloids [2]. Therefore, extract of rue is toxic enough to affect the germination of these weeds and it has potential for using in organic farming.

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EFFECTS OF INTEGRATED USE OF BIO FERTILIZER (INCLUDE N-FIXER MYCORRHIZAE AND P SOLUBLIZER MICROORGANISMS) AND CHEMICAL PHOSPHATE FERTILIZER ON GROWTH, YIELD, YIELD COMPONENT AND ESSENTIAL OIL OF FENNEL (*FOENICULUM VULGAR* MILL.)

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A field experiment was conducted during the spring planting season 2010 at research station of medicinal plants at Shahed University to study the impacts of use of Bio and chemical fertilizers on growth, yield components and essential oil of Fennel (*Foeniculum vulgare* Mill.). Bio fertilizer treatments contains three levels of N-fixer mycorrhizae (no inoculation with the mycorrhizae, inoculate with *Sabacina vermifera* and inoculate with *Pirimospora indica*) and two levels of Phosphate solubilizing microorganisms, with three levels of phosphate chemical fertilizer (0, 50 and 100 Kg ha⁻¹ of P₂O₅). The impact was evaluated in split factorial randomized block design with three replications. Results showed that integrated usage of bio fertilizers has affected most traits. All measured traits in compounds phosphate solubilizing microorganisms and N-fixer mycorrhizae were higher than other treatments, especially more than those traits which treated alone. Furthermore, traits such as compound of umbels, Harvest Index and grain yield were significantly affected by integrated usage of Bio fertilizers, but those mentioned treatments has no significant impacts on traits like weight of 1000 seeds, number of tillers, plant height and essential oil yield of plant. Therefore, this experiment suggested that integrated application of phosphate solubilizing microorganisms with N-fixer mycorrhizae can positively affect increase of plant growth and yield components.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



INFLUENCE OF WATER STRESS AND EXOGENOUS CHITOSAN ON GROWTH AND SOME PHYSIOLOGICAL CHARACTERISTICS OF SAFFLOWER (*CARTHAMUS TINCTORIUS* L.)

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The objective of this research was to evaluate effects of chitosan on morphological and physiological characteristics of safflower (*Carthamus tinctorius* L.) under water deficit stress conditions. For this purpose, a pot experiment was conducted with three factors including water deficit levels (unstressed and 70% available water depletion from soil (water deficit stress)), chitosan concentrations (0, 0.05, 0.1%, all dissolved in 1% acetic acid) along with an additional treatment of distilled water and foliar chitosan application times (before and during stem elongation). Results showed that water deficit significantly decreased plant height, leaf area, shoot and root dry weight, relative water content (RWC) and chlorophyll whereas increased carotenoid, soluble carbohydrates content, malondialdehyde (MDA) and proline content. The foliar chitosan application time effect was significant only for proline content. Spraying with chitosan during stem elongation increased proline content. In stressed plants, application of chitosan (0.05 and 0.1%) increased plant height, leaf area, shoot and root dry weight, relative water content (RWC), chlorophyll and soluble carbohydrates content. Chitosan significantly increased growth and chlorophyll content in the leaves developed on grapevine plants grown under water stress conditions [1]. Application of chitosan also increased accumulation of soluble sugar in water stressed rice plants [2]. MDA content was significantly lower in the stressed plants sprayed with chitosan (0.5 and 0.1%) compared with the control plants. These results showed that chitosan alleviated the harmful effects of water stress and increased the tolerance of plants to stress by increasing osmolytes accumulation and therefore could be used to improve crops in water stress conditions.

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ORGANIC SYSTEM ENHANCES ANISE (*PIMPINELLA ANISUM* L.) YIELD IN COMPARISON WITH CHEMICAL SYSTEM

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In recent years, organic system for cultivation medicinal and aromatic plants has been a growing movement. In present research we compared the effect of organic and chemical system on growth and yield of Anise (*pimpinella anisum* L.). Field experiment was conducted in the agriculture research station, at Sanandaj, Iran, in 2008. Experimental factors of organic system were vermicompost (0, 5 and 10 t.ha⁻¹), PGPR (inoculation and not-inoculation) and zeolite (0 and 4.5 t.ha⁻¹). The treatments were arranged as factorial in a randomized complete blocks design with twelve treatments and three replications. These treatments along with a chemical fertilizer control treatment (N: 90 Kg/ha) were also evaluated using a randomized complete blocks design with thirteen treatments and three replications. Studied traits were plant height, umbel no/ plant, biological and seed yield, essential oil content and essential oil yield. The results revealed that in organic system applying the third level of vermicompost combined with zeolite and PGPR inoculation significantly increased umbel no/ plant, essential oil content and essential oil yield in comparison with chemical system. Such findings were retrieved by other investigators on different medicinal plants such as *Ocimum basilicum* and *Rosmarinus officinalis* [1, 2]. There was no significant difference between these nutrition systems on plant height, biological and seed yield, but in organic system these values were higher than chemical system. Generally the most favourable qualitative characteristics were obtained from organic system. In addition organic system could have environmental advantages when compared with chemical system.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



STUDYING OF CHEMICAL COMPOSITION TOBACCO LEAF IN PROCESSING
DIFFERENT CONDITIONS

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Tobacco plant uses in medical for dental caries, inflammations, worm infestations, dyspepsia, arthritis, lumbago, rheumatism, gout, flatulence, hemorrhages, bronchitis, asthma, scabies, skin diseases, ulcers, rhinitis, and as a brain tonic. In higher dose this is sedative and toxic [2, 4]. Useful part is Leaves. Tobacco processing after harvest is a physiological, chemical and biochemical stage that begin during the yellowing stage and continue through the early phases of leaf drying. The rates of these changes are controlled by temperature, relative humidity, processing type. Important changes that occur include chlorophyll degradation, hydrolysis of starch to free sugars, hydrolysis of proteins into free amino acids, the conversion of nitrate into nitrite, change of polyphenols and alkaloids, degradation of leaf surface diterpenes and sugar esters into more volatile constituents [1,3,5]. This experiment was conducted for study determination of chemical composition (nicotine, nitrite, total nitrogen, reducing sugar, protein, pH, acidic number and resin) in oriental tobacco at conditions of sun-curing (control) and controlled conditions of temperature and humidity relative in bulk-curing. This design was performed with four treatments and three replications in Tirtash Research and Education Center in 2009-2010. Temperature and humidity relative were changed gradual from 30 to 50°C and 85% to 10% during 120-144 hours in bulk curing. Mean of temperature and humidity were in day 40-45 °C and 20-30% and night 20-30°C and 80-85% in sun-curing during 240-480 hours. Results showed that changes of constituents were between 4 % and 14 %. The reduce sugar and resin had the highest changes to other constituents. Alkaloids (nicotine), protein, pH, acidic number and etc hadn't changes. In conclusion the studies showed that controlled conditions of temperature and relative humidity regimes can be used for tobacco processing after harvest and this method hadn't effect on Change the chemistry and quality of the leaf tobacco.

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STABILIZATION OF FLIXWEED (*DESCURAINIA SOPHIA* L.) SYRUP USING SHEAR
REVERSIBLE GELS

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Flixweed (*Descurainia Sophia* L.) is one of the local plants which its seeds contain quite a number of nutraceuticals and being used as a traditional herbal medicine over the years [1]. In addition, in different parts of Iran the seeds are used to prepare a syrup (sharbat) in summer time. Despite the medicinal and nutritional advantages of this product, its industrial production did not happen mainly due to its physical instability or precipitation. Therefore, in the present study, the capability of two local gums (Persian gum and gum Tragacanth) as stabilizers was investigated on the stabilization of Flixweed syrup. For doing so, their solutions were made, and their soluble and insoluble fractions were separated by centrifuge. Then, different concentrations of these fractions were added at different stages to the dispersion of Flixweed (5 wt%) syrup which contained Basil seeds (*Osimum basilicum* L.) and sucrose as well. In addition, the effects of some other parameters namely pH, temperature and ions were studied [2]. The results indicated that the insoluble fractions of Persian gum and gum Tragacanth were able to stabilize Flixweed seeds in syrup at different pH and temperature conditions at reasonably lower concentrations in comparison to whole gums as well as their soluble fractions. Furthermore, their presence slightly affected the organoleptic and rheological properties of syrup [3]. All in all, the findings of this research showed that with considering all other aspects, the industrial production of this nutraceutical and traditional syrup is almost feasible.

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Kish Island



PREDICTION OF THE MEDICINAL PROPERTIES OF PLANT SPECIES OF THE TRIBE CYNOGLOSSEAE (BORAGINACEAE) USING PHYLOGENETIC ANALYSIS

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The family Boraginaceae comprises about 1600 species in approximately 100 genera with center of diversity in Eurasia [1]. Pharmacological properties of this family have been taken into consideration during the past. *Most parts* of these plants especially roots, leaves and flowers have been used in traditional medicine. These organs are used in various forms for different diseases. For instance, powder of Dried, ground roots of *Trichodesma angustifolia* subsp. *angustifolia* mixed with cold water is used for diarrhea [2]. Its flower also has cough calming and a minor narcotic effect. The root is astringent and the leaves have laxative effect. Roots and leaves are used in treating diarrhea, dry and nervous cough, intestinal spasms and internal bleeding. During the process of evolution and speciation of plants, morphological characters can change and whatever the similarity between among the derived units is more, this process is newer. The origin of this variety is due to change in hereditary material particularly in DNA, and it's effective not only in appearance and morphological characters, but also in all biochemical features of the plant. Accordingly the model of phylogenetic relationship was used to achieve an efficient pattern of similar biochemical composition, and finally the similarity of therapeutic features. For this purpose the phylogenetic analysis of tribe Cynoglosseae was performed based on ITS fragments. In this study 23 taxa were studied including 21 species of tribe Cynoglosseae and also *Heliotropium bacciferum* and *Turnefortia rubicunda* as outgroups. Proliferation of nuclear ITS region using polymerase chain reaction was performed. The phylogenetic reconstruction was conducted using GTR+I+G evolutionary model and bayesian inference as implemented in mrbayes software.

Based on the results and with attention to ecological habitats of these plants, the relative and close plants which probably have close medicinal properties can be distinguished. For example because of close relation of *Cynoglossum officinale* with *Lindelofia longiflora*, It can be predicted that all or some properties listed for *Cynoglossum officinale* be found also in *Lindelofia longiflora*. And also existence of the properties of *Trichodesma angustifolia* subsp. *angustifolia* is predictable in other species of *Trichodesma* and probably in species of the genus *Caccinia*. Although the proposed model can't predict all medicinal properties of these species, but It would effectively help the researchers of medicinal plants in purposeful planning and more closer to reality.

ANTIFUNGAL ACTIVITY OF SOME MEDICINAL PLANTS AGAINST SOME TOMATO DISEASES

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Fusarium oxysporum f.sp *lycopersici* and *Rhizoctonia solani* are two important diseases that cause wilting on tomato in the world. Attention to, chemical fungicides cause serious environmental problems and are toxic to non-target organisms, plant metabolites and plant based pesticides appear to be one of the better alternatives as they are known to have minimal environmental impact and danger to consumers in contrast to synthetic pesticides. In vitro studies were carried out to test the antifungal activity of 5 plant extracts, in this study have been used water extract of *Azadirachta indica*, *Melia azadirach*, *Allium sativum*, *Curcuma longa*, *Caryophyllium aromaticus*. 100% stock solution was obtained by soaking separately 1g of different plant parts powder in 10 ml sterilized water then different concentrations 25%, 50%, 100% of plant extracts were prepared by adding sterilized water. Different concentration of plant extracts was incorporated to potato dextrose medium agar. Results have been shown by increasing plant extracts concentration, fungicide property will be increased. All plant extracts except *Caryophyllium aromaticus* showed significant reduction in the growth of *Fusarium oxysporum* f.sp *lycopersici* and *Rhizoctonia solani*. Neem and garlic extract (100% concentration) were the most effective to inhibit the growth of tested fungi but clove extract has no affections. Findings from this study confirmed that plant extract can be used as natural fungicides to control pathogenic fungi, thus reducing dependence on the synthetic fungicides. *Azadirachta indica* which was found to be the most efficient extract, 98% inhibition on *Fusarium* and 96% inhibition on *Rhizoctonia* could be a promising material for controlling these fungi.

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Kish Island



EFFECT OF CHEMICAL SCARIFICATION ON SEED GERMINATION OF *MYRTUS COMMUNIS* L.

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The seeds of *Myrtus communis* L., one of the economically important medicinal and ornamental plants; show coat dormancy and do not germinate under normal conditions. Also, seeds of *Myrtus communis* L. (Myrtaceae) are characterized by the presence of an elaiosome. This fleshy and edible appendage is rich in lipids and proteins. The seeds of *Myrtus communis* need a scarification treatment before left for germination.

It seems that the removal of the elaiosome (Ciccarelli et al., 2004) or the scarification of the seed coat (Makkizadeh et al. 2007) could lead an early germination. In this research, the role of chemical scarification on the seed germination capability of *Myrtus communis* L. was studied. The ripe seeds of *Myrtus communis* L. were collected from plants were grown in the field (Ramin Agriculture and Natural Resources University, Mollasani, Khoozestan province, south west of Iran), in November 2010. Fruit pulp was removed manually. Dry seeds were acid scarified by immersion in concentrated sulfuric acid, nitric acid or hydrochloric acid for 5, 10, 15 or 20 minutes. Untreated seeds were soaked in running water. Seeds were placed in 9 cm diameter Petri-dishes on two layers of filter paper moistened to saturation with distilled water. For all the treatments, 50 seeds were used per each replication, with 4 replicates per treatment. Germination tests were conducted in controlled environment chambers. Germination was defined as the first emergence of the radicle. Newly germinated seeds were counted every 2 days. Those seeds infected by fungi or bacteria were removed and not considered for the calculations. The percentage of seed germination, mean germination time, rate of germination for each replicate was calculated at the end of the experiment. Root length and dry weight were also measured for supplementary explanations. The data were analyzed by factorial analysis and the means were compared with Duncan's test. Results showed that various inorganic acids significantly affected germination percentage, mean germination time, germination rate and root length of seedlings. Time of scarification significantly affected mean germination time, germination rate and root length. In *Myrtus communis* L., seed scarification with H₂SO₄ for 5 or 10 minutes were more effective followed by water soaking for two days. In conclusion, in *Myrtus communis*, scarification with H₂SO₄ caused increasing significant seed germination and scarification was affected by time of acid treatment.

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PRODUCTION OF FUNCTIONAL CAKE BY USING *CINNAMON ZEYLANICUM* ESSENTIAL OIL

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Foods containing fat and oils oxidize slowly during storage. Different oxidation products cause rancidity and reduction of the sensory properties of the food products. Antioxidants are used for preventing of fat oxidation. The commonly used synthetic antioxidants such as butylated hydroxy anisole (BHA) and butylated hydroxy toluene (BHT) are restricted by legislative rules because of doubts over their toxic and carcinogenic effects [1, 2]. Aromatic plants, spices, fruit powders, and fruit kernels have been used in foodstuffs including meat, dairy and bakery products as natural antioxidants and antifungals [3]. In this study, we evaluated antioxidant and antifungal properties of *Cinnamon zeylanicum* essential oil (CZEO) as natural preservative in the functional sponge cake. CZEO was added to cakes in three levels (500, 1000 and 1500 ppm) and the cakes were preserved for 60 days at 25°C. The antioxidant activity of essential oil determined by measuring thiobarbituric, peroxide and free fatty acid values during storage. In addition, antifungal properties of studied essential oil was determined and given as the ratio of colony number in samples containing CZEO to control cakes. The different concentrations of essential oil were able to prevent oxidation rate and reducing preliminary and secondary oxidation products compared with BHA and also, CZEO at three concentrations (500, 1000 and 1500 ppm) reduced the fungal growth more than BHA (100 and 200) and control samples. According to the results of antioxidant, antifungal and organoleptic properties indicated that CZEO has been effective on preservation of the cakes and it can be used for producing of functional foods. It was observed that CZEO was an effective antioxidant and antifungal during 60 days of storage. Therefore, it can be supposed that CZEO was stable during baking and ambient conditions used in this study.

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Kish Island



USING OF *ZATARIA MULTIFLORA* BOISS. ESSENTIAL OIL AS ANTIOXIDANT AND ANTIMICROBIAL COMPONENT IN THE SPONGE CAKE

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Oxidation of fat and oils has an important effect on reduction of nutritional and organoleptic properties of foodstuffs. Today, new tendency has created to use of natural compounds [1]. Cake manufacturers face some problems such as lipid oxidation and fungal growth which reduce the shelf-life of their products [2]. The use of antioxidant and preservative can solve these problems. Synthetic materials like butylated hydroxyl anisole (BHA) and butylated hydroxy toluene (BHT) have been used as antioxidants in foodstuffs. The use of these synthetic antioxidants has been restricted because of their toxicity [3]. Recently, natural plants have attended as a source of biologically active substances such as antioxidant, antifungal, antimutagen, and anticarcinogen [4]. In this study antioxidant, antimicrobial properties of *Zataria multiflora* Boiss. essential oil (ZMEO) was determined. ZMEO was added to the cakes at three levels (500, 1000 and 1500 ppm) and preserved during 60 days at 25°C. The antioxidant activity of essential oil determined by measuring thiobarbituric, peroxide and free fatty acid values during 60 days of storage at 25°C. In addition, antifungal properties of studied essential oil was determined and given as the ratio of colony number in samples containing ZMEO to control cakes. The different concentrations of essential oil were able to prevent oxidation rate and reducing preliminary and secondary oxidation products compared with BHA and also ZMEO at three studied concentrations reduced the fungal growth more than BHA (100 and 200) and control samples. Results of antioxidant, antifungal and organoleptic assays showed that using of ZMEO had effective rule in the preservation of cake and it can be replaced instead of synthetic preservatives in this kind of products.

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COMPARING EFFECT OF TWO MEDICINAL PLANTS ON FUSARIUM AND ROOT KNOT NEMATODE COMPLEX DISEASES OF TOMATO

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Fusarium wilt disease and root-knot nematode both are important diseases of tomato in Iran. *Fusarium oxysporum* f.sp. *lycopersici* is often found in a synergistic relationship with *Meloidogyne incognita* in north of Iran. Management of disease complexes appears to less straight forward than one might anticipate. The use of chemical is becoming less appealing because of the human and environment health implications. Also, the chemicals required are often not within the reach of farmers in most of the developing part of the world. This research is aimed at finding an alternative mode of control. In this research we compared effect of two medical plants, *Azadirachta indica* and *Melia azedarach* from Meliaceae family with chemical compounds on the *Fusarium* and root- knot nematode complex diseases of tomato. Tomato inoculated with *Meloidogyne* and *Fusarium* was treated with 50 g/kg soil neem seed and *Melia azedarach* fruit powder in separate pots in the glass-house. Sixty days after inoculation the plants were uprooted and root gall indices, disease severity of *Fusarium* and tomato growth parameter were determined and results have been done by SAS test and significant difference $P \leq 0.01$. Results have been shown both medical plants significantly ($P \leq 0.01$) reduced the disease severity of *Fusarium* and root-knot nematode. All the treatments significantly improved the growth of the plants as compared to untreated inoculated plants. Carbofuran was highly effective against nematode, Bavistin against fungus, neem seed and *Melia azedarach* fruit powder against both the pathogens. Neem and *Melia azedarach* decrease root knot index from 4.7 in control treatment (fungi+nematode) to 0.25 and 0.5, also decrease disease severity from 85% in control treatment to 12% and 26%. Neem not only was more effective than *Melia azedarach* to control these diseases but also cause increase in growth characters such as plant weight and length. Results suggest the possible use of neem seed *Melia azedarach* fruit powder instead of chemical compound for control of the root-knot nematodes – *Fusarium* wilt disease complex of tomato.

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STUDY OF THE TRAGACANTH S ASTRAGALUS AS A MEDICINAL AND INDUSTRIAL PLANT FOR DEVELOPMENT OF RURAL ECONOMY

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Development and spread of the tourism in the rural areas with use the various natural and cultural attractions of it in the village are one the best sources of income and livelihoods for rural persons. At the same time it can help to protect their incomes and the unique natural and cultural attractions in the villages. Plants of the blessings that God-given natural resources and pharmaceuticals in addition to environmental benefits and economic benefits are numerous. *Astragalus* with over 5000 known species in the world is the largest genus of the flowering plants. These plants are highly adapted to the harsh environments of the arid environments, by morphological and anatomical changes. Cushion growth form, hard spines and chemical compounds in *Astragalus*, which has a diverse utilization in medicine and industry. Of the total 1000 known *Astragalus* species in Iran, 45 species are known as Tragacanthic species of which 22 species are in Razavi, North and South Khorasan provinces. These species are scattered in 2.6 million hectares of rangelands in the Razavi, North and South Khorasan provinces. The objectives of this study were to investigate; 1-The best method for sustainable harvesting of Tragacanth. 2- The ability of amount production of Tragacanth in habitats of Razavi, North and South Khorasan provinces. Results showed that there are considerable differences between slop directions in terms of morphological and anatomical features of the indivial plants. In drier areas Tragacanth yield was higher than in more temperate areas. Economical density in terms of production for these plants showed to be 157 plants per hectare in the Northern areas and 496 plants in mid altitude areas of the Razavi, North and South Khorasan provinces, with yield of 2.85 and 1.48kg dried Tragacanth, respectively. Increasing the number of cuts from 1 to 7 increased the plant exudation, but yield per cut was decrease. The highest and lowest amount of exudation per plant was 51.78 and 0.41g, respectively and the production potential of Tragacanth is 1040 tons in habitats of Khorasan province.

CHEMICAL COMPOSITION OF ESSENTIAL OIL, ANTIBACTERIAL ACTIVITY AND BRINE SHRIMP LETHALITY OF EXTRACTS FROM *SEDUM PALLIDUM*

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The essential oils of *Sedum pallidum* is obtained by hydrodistillation and analyzed by (GC/MS) for determining their chemical composition and identification of their chemo types. The major component was Hexadecanoic Acid (33.5%), other predominant components were phenol (9.96%), Eicosane (9.19%), Cyclotrisiloxane, hexamethyl (4.78%), Oxime-, methoxy-phenyl (4.34%), Neophytadiene (4.32%), phytol (3.86%), 3. alpha H-2- Oxofurano (2.78%). The extracts from *Sedum pallidum* had interesting activity against *Proteus mirabilis* (10 mm diameter), *Enterobacter cloacae* (11mm diameter) observed against *Bacillus subtilis* and *Klebsiella pneumoniae*. The positive control, Ampicilin, Gentamicine and Stereptomaicin had shown zone of inhibition resistant all bacterial. The brine shrimp lethality activities of ethanolic extracts of *S. pallidum* were evaluated in this study. The results of cytotoxic activity of these extracts were more active against brine shrimp lethality of *Artemia salina*.

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GERMINATION BEHAVIOR OF *ARCTIUM LAPPA* SEEDS UNDER DIFFERENT CHEMICAL AND PHYSICAL TREATMENTS

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Burdock (*Arctium lappa* L.) a medicinal plant of Asteraceae family is an herbaceous and biennial species that grows wild in temperate, humid and shady regions of Iran. In order to investigate effects of some chemical and physical treatments on *A. lappa* seed dormancy and germination, an experiment was conducted based on completely randomized design with 4 replications in medicinal plant laboratory of Department of Horticultural Sciences, University of Tehran. Seeds were collected from a wild population in Shazand, Markazi province. Treatments included: control (untreated seeds), soaking in GA₃ at 250, 500, 750 and 1000 ppm (48 h), soaking in distilled water (48 h), KNO₃ (0.02%), stratification for 7 days, mechanical scarification (sand paper) and chemical scarification (H₂SO₄ 75%) for 3 minutes and hot water (80°C) for 2 minutes. Results revealed that GA₃, KNO₃, and stratification treatments performed better than control in which significantly increased both seed germination percentage and rate. The highest seed germination percentage was observed in GA₃ 500 ppm which was significantly different from other treatments. Scarification treatments were not significantly improved seed germination percentage. Also application of hot water and H₂SO₄ caused zero seed germination. It seems dormancy in *A. lappa* seeds may be more due to physiological dormancy rather than other dormant factors.

EFFECTS OF LIGHT, DARKNESS, COLD AND DROUGHT STRESSES ON SEED GERMINATION AND SOME SEEDLING TRAITS OF SESAME (*SESAME INDICUM* L.)

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To study the effects of continuous light, darkness, cold and drought stresses in dry and wet conditions on germination percentage of seeds and length, fresh and dry matter weight of stem and roots of seedlings of sesame (*Sesame indicum* L.) cv. Karaj 1, a laboratory experiment was conducted in Karaj in 2011. Four hundred sesame seeds were maintained on wet filter papers laid in petri dishes. In light experiment, petri dishes containing seeds were maintained in germinator at 25°C under continuous light. For dark, petri dishes were covered by aluminum foil and maintained at 25°C in germinator. For studying the effects of cold and drought stresses, seeds in petri dishes were maintained in mild cold condition (4°C), freeze condition (-10°C) and high temperature (oven 60°C) either in wet or dry conditions. The control treatment was maintained of seeds in germinator at 25°C under 16h light and 8h darkness. At the end of each experiment percentage of seed germination and length, fresh and dry matter weight of stem and roots of seedling in each treatment were assessed. Based on the results, continuous darkness increased considerably the length and fresh weight of stems but decreased their dry weight. The effect of light did not follow a similar pattern in different treatments. Drought stress decreased stem length (61.50%), stem fresh weight (51.69%), stem dry weight (46.66%), root length (47.93%), root fresh weight (94.78%) and root dry weight (35%) compared to the control treatment. Mild cold in wet and dry conditions decreased stem length (36.36% and 41.51%, respectively) and root length (8.25% and 38.41%, respectively) but in this condition fresh and dry weight of stems and roots were considerably increased. Freeze temperature had negative effects on all measured traits. Generally, the results of these experiments indicated that cultivar Karaj 1 of sesame is very susceptible to high and freeze temperatures at germination and seedling stages, but it tolerate well the mild temperatures, therefore it can be cultivated as an autumn crop in areas with mild temperature before freezing of soil.

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ANTIOXIDANT AND FREE RADICAL SCAVENGING ACTIVITIES OF *THUJA ORIENTALIS* L. EXTRACTS

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Thuja orientalis L. (Cupressaceae) is an herbal medicine in Korea and china. The extracts of this plant were used as treatment for many medical conditions, including viral and bacterial infections, coughs and other respiratory ailments, and cancer. Earlier studies demonstrated that *T. orientalis* extracts decrease the toxic effects of chemotherapy and radiation therapies [1]. A literature survey showed that the *Thuja* species has been found to be rich in Flavonoids as glycosides [2]. But, there are no previous data available in the literature on the quantitative analysis of bioactivities in different solvent extracts.

The purpose of the present study was to evaluate the total phenolic and flavonoid contents in different *T. orientalis* extracts as: water, methanol, ethanol and ethyl acetate and their antioxidant and free radical scavenging activities. We have used gallic acid and quercetin as standards in determination of the total phenolics and flavonoids respectively. The plant was collected in Juli 2011 from Gorgan province. For the measurements of the reductive ability, we investigated the Fe⁺³-Fe⁺² transformations in the presence of the extracts using the method of Oyaizu [3]. The reduction capability of the DPPH radical was determined by the decrease in its absorbance at 517 nm, induced by each extracts and as standards were used ascorbic acid and BHT [4].

Among all of the extracts, highest amount of total phenolic compound (8.063 ± 0.21 mg GAE/ g plant material) was found in the methanol extract, whereas the lowest amount (5.503 ± 0.18 mg GAE/ g plant material) was found in the water extract of the leaves. Like phenolic compounds, the highest DPPH scavenging activity (IC₅₀ = 36.11 µg/ml) and highest reducing power were found in the methanol extract. The amounts of total flavonoids of all of the extracts were determined. The ethyl acetate extract of *T. orientalis* contained highest amount of flavonoids compared to the other extracts. Based on these results, the reducing power and DPPH radical scavenging activities of the methanol extract of *T. orientalis* may be attributed to the high content of phenolics.

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PHYSICAL SEED DORMANCY IN GLOSSY BUCKTHORN (*FRANGULA ALNUS*); DORMANCY BREAKING REQUIREMENT

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Glossy buckthorn (*Frangula alnus*) is native to northern part of Iran and one of endangered medicinal plant. The bark contains 3-7% anthraquinones, accompanied by anthrones and anthranols. Its vegetative and sexual propagation is very difficult. The seed is known for its physical and deep physiological dormancy. In the present study, seeds' coat were analysed anatomically to determine its water absorption ability. Later, some pretreatments of physical and chemical scarification were carried out to break physical dormancy of the seeds. For physical scarification, a sharp knife and sand paper were utilized. In the chemical scarification, seeds were immersed in pure sulphuric acid (H₂SO₄) for either 2, 4, 8, 10, 20 and 30 min., and then rinsed thoroughly in running water for 20 min. After scarification, different treatments of gibberellic acid and potassium nitrate for breaking dormancy and speeding germination.

Anatomical analysis suggested glossy buckthorn seeds having hard, impermeable macrosclereids seed coat. In contrast to scarified seeds, non-scarified seed did not absorb water. Analysis of variance indicated that the absorption of water and weight of seeds scarified with knife and sulphuric acid for 20 and 30 min significantly increased. These results suggested that *Frangula alnus* seeds exhibit both paradormancy with hard seed coats and endodormancy [1, 2]. Therefore, based on seed-coat thickness and hardness and viability testing longer scarification times are suggested [3].

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Kish Island



EFFECT OF VERMICOMPOST, PGPR AND ZEOLITE APPLICATION ON YIELD, YIELD COMPONENTS, ESSENTIAL OIL CONTENT AND CHAMAZULENE PERCENTAGE OF GERMAN CHAMOMILE (*MATRICARIA CHAMOMILLA* L.)

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In this research, the effects of bio-organic fertilizers and zeolite on yield, yield components, essential oil content and chamazulene percentage of *Matricaria chamomilla* L., as, one of the most important aromatic and medicinal plant, was investigated. This study has been carried out at the Tarbiat Modares University research field, Tehran, Iran during 2008. The experimental design was as three factor factorial based of completely randomized block design with three replications. The factors were mixture of *Azotobacter chroococcum*, *Azospirillum lipoferum*, & *pseudomonas flouresence* (b_1 =no inoculated and b_2 = inoculated), vermicompost ($v_1=0$, $v_2=5$, $v_3=10$ ton/ha) and zeolite ($z_1=0$ and $z_2=9$ ton/ha). The results showed that with increasing of vermicompost levels, all traits were increased as the highest value of essential oil, flower yield, biological yield, number flower in plant and height were obtained with application of 10 ton/ha vermicompost. Flower yield and essential oil content were also significantly increased by PGPR inoculation and zeolite application. Zeolite application had a significant effect on essential oil content but no significant effect on chamazulene percentage. There was positive and synergistic interaction between PGPR inoculum and vermicompost levels on dry flower yield, as the highest and lowest flower yield was obtained in v_3b_2 and v_1b_1 treatments with 448.73 and 204.31 kg/ha, respectively. Consequently, it seems that the organic cultivation of German chamomile as an alternative system in chamomile production can increase flower yield, essential oil and chemical constituent [1-3].

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A SURVEY ON THE EFFECTS OF SEED OIL OF EVENING PRIMORS (*OENOTHERA LAMARCKIANA*) ON ECZEMA

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Oenothera Lamarckiana, a member of Onagraceae Family, is a biennial plant with yellow flowers. It can be categorized as significant and highly-prescribed medicinal plants. It is originally from North America, but, today, Asian countries such as China, Japan, and Korea are its major producers. The most important components of the oil are linolenic fatty acid, palmitic acid, stearic acid, and gamma linoleic acid. Its seed oil is largely used in pharmaceutical and health-care industries. It is widely acknowledged that a large number of people contract skin diseases due to neglecting hygiene, malnutrition, and psychological problems. One of the most common skin diseases is eczema which can be either endogenous or exogenous type. Among the symptoms of both are the skin swelling, redness, itching and discharge. The seed oil of *Oenothera Lamarckiana* is recommended to ease all such disorders. In our researches, at first, we extracted the seed oil of *Oenothera lamarckiana*. Then, after analysis, it was found that, amongst its components, linoleic acid with 70.6% and gamma linoleic with 6.6% have the highest amounts of fatty acids. The oil was prescribed to patients in one year. It was found that its therapeutic effects would become apparent in at least two month after regular use. Furthermore, it was observed that it produces some positive effects on xeroderma_ skin dryness, skin softening and moisturizing, frostbite treatment, and burns. Regarding side effects, it has the least amount among similar oils and creams.

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16, 17 May 2012
Kish Island



ANTIBACTERIAL EFFECT OF AQUEOUS EXTRACTS OF TWO SPECIES OF *TERMINALIA* ON SOME PATHOGEN BACTERIA

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In this study, antibacterial effects of aqueous extracts of two species of *Terminalia* (*T. chebula* and *T. citrina*) leaves were investigated. The effect of the extracts against two gram-positive bacteria (*Corynebacterium diphtheria*, *Staphylococcus aureus*) and three Gram-negative bacteria (*Escherichia Coli*, *Shigella flexeneri*, *Pseudomonas aeruginosa*) bacteria was tested. The aqueous extracts were prepared in concentrations of 0.1, 0.3 and 0.5 (g/ml). Disc diffusion assay was performed to evaluate antibacterial activity. Disks containing water, penicillin and tetracycline (10mg) were used for control. Agar diffusion method on the mueller Hinton agar media and evolution of minimal Inhibitory concentration (MIC) by dilution method was tested. The dishes were incubated at 37 ° C for 24 hours. Both aqueous extracts were effective against gram negative and gram positive bacteria but gram-positive bacteria were sensitive. Minimal inhibitory both extracts of concentration using for the bacteria was 0.5 g/ml for all gram negative and gram positive bacteria.

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HPLC-UV METHOD TO ASSAY OF SHATAVARIN IV IN ROOT EXTRACTS OF *ASPARAGUS RACEMOSUS*

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The genus *Asparagus* has more than 300 species growing widely in eastern Asia including India, China, Korea and Japan. *Asparagus racemosus* (Asparagaceae), commonly known as “Shatavari” is mainly distributed wild in tropical and sub-tropical parts of India. *A. racemosus* is used in Ayurveda as a galactagogue, aphrodisiac, anodyne, diuretic, antispasmodic and nervine tonic since time immemorial. The major active constituents of *A. racemosus* are steroidal saponins (Shatavarins I-IV) that are present in the root of this herb. Shatavarin IV is a glycoside of sarsasapogenin having two molecules of rhamnose and one molecule of glucose. Shatavarins I and IV have been reported to be the major steroidal saponins in the roots of *A. racemosus*. The marker of our interest in *A. racemosus* is difficult to detect by HPLC-UV due to lack a strong UV chromophore. Hence these compounds are detected with Evaporate Light Scattering Detector (ELSD). In this study, two kinds of extracts from roots of *A. racemosus* were analysed by high-performance liquid chromatography (HPLC) with photodiode array (PDA) detector (flow cell, 10 µl, 50 mm) on C₁₈ column utilising water and acetonitrile as mobile phase at 205 nm. The average amount of shatavarin IV in two dry extracts was 0.36 and 3.42% (w/w).

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16, 17 May 2012
Kish Island



CAFFEYOYLQUINIC ACID DERIVATIVES AND FLAVONOLS IN *BUPLEURUM CHINENSE*

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The caffeoylquinic acid derivatives including 3-*O*-caffeoylquinic acid, 4-*O*-caffeoylquinic acid, 5-*O*-caffeoylquinic acid (chlorogenic acid) and caffeic acid have been identified in *Bupleurum chinense* aerial parts using reference compounds, chemical, spectral evidences and chromatographic data. In addition, the flavonoid aglycones were quantified after acid hydrolysis in sample. The samples analysis was carried out by high-performance liquid chromatography with photodiode array detector (HPLC-PDAD) on a C₁₈ column with 4% (v/v) aqueous acetic acid and acetonitrile as the mobile phase. Total phenolic and total flavonoid contents ranged from 7.3 to 18.7% chlorogenic acid equivalent and 0.58 to 2.72% quercetin equivalent. The amount of chlorogenic acid, quercetin, kaempferol, and isorhamnetin in the plant material were 3.48, 1.11, 0.03 and 0.166 g per 100 g dry plant, respectively.

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THE EFFECT OF SALICYLIC ACID PRETREATMENT ON PHOTOSYNTHETIC PIGMENTS, PHENOLIC COMPOUNDS AND PAL ACTIVITY IN *NIGELLA* PLANT UNDER DROUGHT STRESS

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Environmental stress, especially drought stress, can play an important role in reducing plant growth, especially during early growth stage in arid and semi arid regions in Iran. For cultivation of medicinal plants in arid and semi arid areas, the assessment of their tolerance is very important. In this research, the effect of salicylic acid (SA) on photosynthetic pigments (chlorophyll a, b, total chlorophyll and carotenoids), polyphenol compounds, anthocyanin, flavonoids and phenylalanine ammonialayse (PAL) activity of black cumin (*Nigella sativa*), under drought stress in hydroponic culture was investigated. This experiment was conducted as a complete randomized design in a factorial arrangement with three replicates. Experimental designs included three levels of SA (0, 5 and 10 μ M) and four levels of drought stress (0, -0.2, -0.4 and -0.6 Mpa induced by Polyethylene glycol 6000). Results showed that drought stress caused a significant reduction in photosynthetic pigments, polyphenol compounds, anthocyanin, flavonoids and PAL activity; so that the highest reduction was in -0.6 Mpa treatments. SA had a positive effect on photosynthetic pigments, polyphenol compounds, anthocyanin, flavonoids and PAL activity and increased these parameters under normal and stress conditions. Reduction of photosynthetic pigments in drought stress may be related to degradation of chloroplast structure and photosynthetic apparatus, chlorophyll photo oxidation, destruction of chlorophyll substrate, inhibition of chlorophyll biosynthesis and the increase of chlorophyllase activity [2, 3]. SA protects the photosynthesis apparatus through the increment of antioxidant ability and synthesis of new proteins [1]. The decrease of phenolic compounds under drought stress could be related to antioxidant characteristics of these compounds to scavenging of ROS under drought stress [4]. SA increases the plant tolerance to drought stress through the raise of these compounds under stress conditions. It seems that the increment of PAL activity in plants which is treated with SA led to the increase of polyphenol compounds, anthocyanin, flavonoids. In conclusion, SA could protect the *nigella* plant against drought stress through the increasing of all the mentioned traits. In this investigation, 10 μ M SA was the most effective concentration under both conditions.

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16, 17 May 2012
Kish Island



ESSENTIAL OIL ANALYSIS OF *CICHORIUM INTYBUS* L.

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Cichorium intybus L. commonly known as Chicory or Kasni has a long history of medicinal herbal use and is especially of great value for its tonic effect upon the liver, cardio and digestive tract. In this study, the composition of volatile oil from overground parts of *C. intybus* has been surveyed. Two samples of *C. intybus* aerial parts were collected at flowering stage in center of Iran (Kashan, Isfahan province). Volatile compounds were obtained by a two-step extraction of hydrodistillation and liquid-liquid extraction. Distillate was extracted with pentane. The organic layer was separated, dried over anhydrous sodium sulphate and concentrated to 0.5 ml under reduced pressure. The concentrated extract had a strong odor and yellow color. The separation and identification of the oil components were carried out using a combination of GC/FID and GC/MS. The analysis of the oil revealed the presence of twenty components identified in the aerial parts of this herb. The main components were Carvacrol (50.1%), Thymol (13.3%), Cinnamic aldehyde (12.4%), Camphor (4.4%), Carvone (4.1%), Linalool (3.9%) and α -Terpineol (2.1%).

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STUDY OF EXTRACTABLE BIOCHEMICAL AND ANTIOXIDANT MATERIALS FROM RICE PLANT STRAW

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Regard to huge amount of agricultural wastes in Iran, the techniques for extraction of chemical production from these wastes may have economical importance [1]. In the present study, the possibility of furfural, ethanol and methanol production from rice straw (hashemi and alikazemi varieties) and phenolic compounds and flavonoids extraction from rice straw and seeds (hashemi and alikazemi and varieties) were investigated. The rice straw was imposed to Hydrochloric acid hydrolysis for of furfural; ethanol and methanol production and methanol distillation was carried out for phenolic compounds and flavonoids extraction. The amount of furfural, ethanol and methanol were assayed by GC and phenolic compounds and flavonoids determination were done using reverse phase HPLC. The amount of furfural, using as a solvent in oil and gas refinery, in HCl digested rice straw as about 5 percent in both varieties. Ethanol and methanol production was about 1 percent that is very low due to disuse of biological fermentation methods. In rice straw, total phenolic compounds were about 1.5 folds higher in Hashemi variety in compare to alikazemi. HPLC analysis indicated most of this phenolic compounds was Caffeic acid and Pyrogallol [2]. In seeds, caffeic acid and pyrogallol were existed in all varieties almost with the same amount however; Gallic acid was identified only in hashemi variety. The flavonoids analysis indicated that the highest amount of Apigenin was identified in hashemi variety. Also, Kaempferol was detected only in alikazemi variety. The results indicated that rice straw extraction can be used for furfural, Caffeic acid and Pyrogallol, Apigenin and Kaempferol production. Biological fermentation is essential for ethanol and methanol production from rice straw and need further experiments.

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16, 17 May 2012
Kish Island



UPLC AND HPLC OF CAFFEYOYLQUINIC ACIDS IN BURDOCK

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Ultra-performance liquid chromatography (UPLC) and high-performance liquid chromatography (HPLC) with photodiode array (PDA) detector methods have been developed for the analysis of caffeic acid derivatives in root and leaf of burdock. Separation was performed on C₁₈ column at ambient temperature at 330 nm. Both methodologies were validated in terms of linearity, precision, and recovery. The results showed that the major advantages of UPLC, over HPLC were the fast analysis, narrow peaks, high sensitivity, and reduction of solvent consumption. Subsequently the methods were applied for the identification and quantification of 5-*O*-caffeoylquinic acid (5-CQA) and 1,5-di-*O*-caffeoylquinic acid (1,5-DCQA) in samples. The total phenolic content for samples ranged from 3.93 to 14.13 g of 5-CQA equivalent/100 g dry plant material. There was a significant variability from 89 to 571 mg/100g for 5-CQA and 62 to 486 mg/100 g for 1,5-DCQA in dry material.

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EFFECTS OF CULTURE SUBSTRATE AND INDOLE-3-BUTYRIC ACID (IBA) IN ROOT FORMATION OF THYME, *THYMUS VULGARIS* L., PLANTS

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Thymus vulgaris is a perennial shrub which grows in many regions in the world. It belongs to the Lamiaceae family and is an aromatic and medicinal plant. Schwarz et al [1] reported that the main essential oil components of *Thymus vulgaris* were Thymol, Carvacrol and α -Cymene. This plant need warm climate and sufficient light for optimum growth and its propagation carried out by seeds, cutting and plant separation [2]. Cutting is still the most important means of plant propagation since cutting propagation is fast, simple and does not require expensive facilities. The aims of the research were to study effects of culture substrate and indole-3-butyric acid (IBA) in root formation in cutting thyme. The ends of cutting plants were immersed in IBA solution with different concentration including 20, 25, 50, 75 and 100 $\mu\text{M L}^{-1}$. The treated cutting cultivated in three culture substrate including perlite, cocopite and acid washed sand and irrigated with Hougland nutrient solution twice per day. The experiment was carried out in a factorial completely randomized design with 10 replication plants. The results indicated that IBA has significant effects in root formation of *Thymys vulgaris*. The best concentration of IBA was 20 $\mu\text{M L}^{-1}$ where the maximum of root numbers and root length was observed. The root numbers and length was decreased by increase of IBA application. The perlite culture of cutting indicated the greater root number and the higher length when compared to cocopite or sand culture.

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BENEFICIAL EFFECTS OF SILICON NUTRITION IN ALLEVIATING SALINITY STRESS IN THYME, *THYMUS VULGARIS* L., PLANTS

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Salinity is one of major factor in limiting plant growth and crop productivity [1]. Silicon (Si) is the second most abundant element in the soil and effectively mitigates the effects of various abiotic stresses such as drought, heavy metal toxicity and salinity on plants [2]. *Thymus vulgaris* is a salt tolerance perennial plant. Its valuable medicinal plant possesses antispasmodic, antiseptic, expectorant, carminative and antioxidative properties. In the present study the ameliorating effects of silicon nutrition supplied as 1.7 mM sodium silicate was investigated on the perlite grown *Thymus vulgaris* plants under salinity stress i.e. 100 mM sodium chloride.. The plant irrigated with Hougland nutrient solution twice per day modified based on treatments. The experiment was carried out in a factorial completely randomized design with 10 replication plants. Apparently, *Thymus vulgaris* is not salt tolerance plants since 10 percent of plant could withstand under salinity and dry. Also, salinity induced marked reduction in fresh and dry weight of remained plants. Similarly, root and shoot length decreased due to salinity. Silicon nutrition ameliorated the deleterious effects of salinity on the growth of *Thymus vulgaris* plants where no one of Si-fed plants died under salinity. Besides, plants grown with 1.7 mM Si under salinity indicated significantly higher growth compared to plant did not fed with Si. Further experiment regarding Na⁺ and K⁺ concentration and antioxidant activity is going on.

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EFFECT OF ALTITUDE ON ESSENCE, MINERAL AND ORGANIC MATERIAL IN COMMON HORSETAIL (*EQUISETUM ARVENSE* L.)

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Growth and development of plants in natural habitat is affected by different environmental factors like altitude. *Equisetum arvense* with English name of field horsetail or common horsetail is an herbaceous perennial plant, native throughout the arctic and temperate regions. The plant contains several substances which can be used medicinally and rich in the minerals including Si. This plant is utilized for the treatment of hepatitis in oriental traditional medicine [1]. The aims of the research were to study the effect of altitude on essence, mineral and organic material in common horsetail. The sampling of fertile stems was carried out from to different natural habit of plant included Shast Kola forest in Gorgan with 250-1000 meter altitude and Olang- Ramian with 1300-2000 meter altitude. Samples were dried in root temperature and their essence was extracted by Clevenger hydrodistillation method. The amount of extracted essence was greater in Shast Kola forest with lower altitude in compared to Olang- Ramian with 1300-2000 meter altitude. The percentage of dry material, total proteins, lipids, fibbers, and ash were 96.15, 10.03, 2.47, and 26.83, respectively that did not affected by site of sampling. Also, the calcium, phosphorous and potassium content of samples were 1.13, 0.19, and 0.57 percent, respectively. Further experiment regarding Si content and essence compounds is going on.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



STUDY OF CYTOTOXICITY ACTIVITY OF *OROBANCHE ORIENTALIS* G. BECK METHANOLIC EXTRACT AGAINST HELA CELL LINE

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Medicinal plants are the richest bioresource of drugs for traditional. In this study the anticancer activity of methanolic extract of *Orobancha orientalis* G. Beck was evaluated. This genus has 36 species in Iran. This wild medicinal plant is belongs to the family Convolvulaceae (1). The effect of cytotoxicity of extract concentrations (10, 7.5, 5, 2.5, 1, 0.5, 0.25, 0.125, 0.0625, 0.0313 mg.ml⁻¹) on Hela Cell Line by MTT test after 72 hour was assaied. This investigation reveals that methanol extract can not be effective considerable on the proliferation of Hela Cell Line, But concentration of 15 (mg.ml⁻¹) was inhibited partly. The effect of plants on the proliferation or nonproliferation or reduce proliferation of cancer cells alone can be effective in the cure and treatment of diseases or medical technology.

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THE PATH ANALYSIS OF THE FEATURES AFFECTING DILL (*ANETHUM GRAVEOLENS* L.) ESSENTIAL OILS CONTENT AND SEED YIELD

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This experiment was conducted in 2010 at Alborz Research Station, Karaj, Iran, to evaluate the effect of planting date and planting density on dill. Experimental design was split plot in the form of a randomized complete block design (RCBD) with three replications. Treatments of the experiment included four planting dates with intervals of 20 days (beginning from March 11th) and four planting densities (5, 7, 11 and 22 plants/m²). To find the main reason of the changes and the role of each trait in variations of essential oil content and seed yield, traits which had been achieved from other traits (such as essential oil yield) were removed and then, the correlation was obtained again. Results of Pearson correlation indicated that essential oil content was positively correlated to the number of lateral branches, plant height, seed yield, single plant shoot yield and the number of inflorescences (P≤0.01). Essential oils content was negatively correlated to biologic yield (P≤0.01). Stepwise analysis of essential oils content (as the dependent variable) represented that the number of inflorescences, harvest index and seed yield entered to the model respectively. Moreover, stepwise analysis of seed yield (as the dependent variable) indicated that biomass yield and internodes length entered the model respectively. Path analysis showed that among the traits which had entered the stepwise analysis, the number of inflorescences had the highest direct positive effect (0.452) on essential oils content. Moreover, path analysis indicated that among the entered traits to the stepwise analysis, biomass yield had the highest direct effect (0.603) on seed yield.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EVALUATION OF RADICAL SCAVENGING ACTIVITY OF *LAURUS NOBILIS* L. ENDO-, MESO- AND EXOCARP EXTRACTS

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Laurus nobilis L. (Lauraceae) are traditionally used to treat the symptoms of gastrointestinal problems, such as epigastric bloating, impaired digestion, eructation and flatulence [1]. However, from a toxicological point of view, ethanol and water, as solvents, are safer than other organic solvents, and therefore more suitable for the food and pharmaceutical industries. Thus water and ethanol were used as solvent in the present study.

By surveying of literature, there is no report about comparison of radical scavenging activity of endo-, meso- and exocarp of *Laurus nobilis* fruits. The total phenolic and flavonoid contents of all the extracts were determined [2, 3]. The amount of total phenolic contents was calculated as mg of gallic acid equivalents from the calibration curve of gallic acid standard solution. The total flavonoid content was calculated as quercetin from a calibration curve. Antiradical activity of all the extracts was measured with a solution of 0.1 mM DPPH radical in ethanol and compared with that of ascorbic acid and BHT [4].

The six extracts showed varying degrees of efficacy in DPPH assay in a dose-dependent manner. The ethanol and aqueous extracts of the mesocarp and endocarp were displayed highest and lowest DPPH radical scavenging activity respectively. The order of total phenolic content of the extracts of *Laurus nobilis* was found to be meso-water > meso-ethanol > exo-water > exo-ethanol > endo-ethanol > endo-water. The order of total flavonoids of the extracts of *Laurus nobilis* was found to be exo-ethanol > meso-ethanol > endo-ethanol > exo-water > meso-water > endo-water. The ethanolic and then aqueous extracts of mesocarp with the higher amounts of total phenolics and flavonoids, were the most potent antioxidants in DPPH radical scavenging test whereas the aqueous and ethanol extracts of the endocarp containing the lower amount of phenolics and flavonoids were the weaker in the activity. On the basis of the results obtained, *Laurus nobilis* mesocarp extracts were found to serve as a potential source of natural antioxidants due to their marked antiradical activity.

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INTRODUCING CAMPHOR AS A SUITABLE PLANT FOR SALINE AND DRY AREAS, AND EVALUATING ITS ECOTYPIC AND SALINITY-DROUGHT TOLERANCE FEATURES

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Saline soils account for 15% of Iran agricultural lands (i.e., 24 million ha). To fight the salinity problem, it is important to find salinity tolerant species. In this experiment, camphor was collected from its natural habitats (Arak, Hamedan and Shahrekord) at early vegetative growth, full flowering and seed maturity stages, by the means of repeated plotting. At full flowering stage, plant height, the number of tillers, large and small diameter of canopy, root length and weight, total, a and b chlorophyll content, plant dry weight, soluble sugars content, proline, sodium, potassium, magnesium, calcium, chlorine, iron and essential oils percentage were measured. Collected seeds from the three habitats were studied under laboratory conditions in four separate experiments, using factorial in the form of a completely randomized design with three replications. Treatments of the experiment were three populations (Arak, Hamedan, Shahrekord), three temperatures (10, 25 and 35°C) and six salinity levels (0, 100, 200, 300, 400 and 500 mM NaCl + CaCl₂ 50:50 ratio) and seven drought stress levels induced by polyethylene glycol (PEG) (0, -2, -4, -6, -8, -10 and -12 osmotic potential bars). Moreover, reasonable correlation between the traits was determined using regression (stepwise and path analysis) and Pearson correlation. Results indicated that there were significant differences between the three habitats. Habitat, temperature, salinity and drought significantly affected germination percent, plumule and radical length, radical / plumule ratio, seed vigor index and seed germination index. Although salinity stress reduced shoot yield, however, resulted in the enhancement of essential oils percent. Camphor was tolerant to salinity and drought at germination stage and was able to germination in 500 mM salinity level and -12 bars drought level, although the germination was reduced. The optimum temperature for germination was 23-25°C and seeds varied greatly according to their parent plant growing condition (habitat). Overall, results proved the tolerance of camphor to salinity and indicated that camphor is a high value medicinal range plant.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



STUDY OF ANTHOCYANIN PRODUCTION IN GRAPE CALLI OBTAINED FROM CLUSTER GRAPE CULTURE

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Anthocyanins are the largest group of water-soluble pigments in the plants. One of the flavonoids anthocyanin derivatives that are unique to plants and a branch of anticancer compounds, anti-inflammatory and antioxidant may protect the heart. Grape and its cell culture extracts are rich in flavonoids that are biologically active. In this research grape calli were produced in a Chilean grape cultivar. Green cluster were used as the explants for in vitro culture on the MS medium supplemented with of 150 mg/l Ascorbic acid, Citric acid and polyvinylpyrrolidone. The effect of the TDZ (3 and 4 mg/l) and NAA (0.1, 0.5, 1 and 2 mg/l) were investigated for callogenesis trait. Anthocyanin production was observed in all studied treatments and T₅ a treatment produced the greatest of callus and the highest concentration of anthocyanin [1,2].

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THE EFFECTS OF CaCl₂ ON GERMINATION OF BASIL (*OCIMUM BACILIMUM* CV. GREEN) SEEDS

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Salinity is a limiting factor that affects seeds germination and plant growth; however, plants can tolerate it to some extent by some defense mechanisms. This experiment was conducted in the form of a completely randomized design with three replications, under laboratory conditions. Treatments of the experiment included culture medium (in light and dark) and salinity (0, 100, 200, 300, 400 and 500 mM CaCl₂). Results indicated that culture medium and salinity significantly affected germination percent, germination speed, seed vigor index and seedling length ($P \leq 0.01$). The interaction of culture medium \times salinity had also a significant effect on germination percent, germination speed and seed vigor index ($P \leq 0.05$). Mean comparison of the effect of culture medium on the measured traits indicated that the highest germination percent (27.2%), seed vigor index (0.81), germination speed (0.78 seeds/day) and seedling length (1.6 cm) were achieved in the dark culture medium. Studying the effect of salinity stress levels on the measured traits represented that the highest germination percent (48.33%), seed vigor index (1.44), germination speed (1.42 seeds/day) and seedling length (2.48 cm) were obtained in the control (0 mM), however, the lowest values of these traits were achieved in 300 mM (2%, 0.02, 0.04 seeds/day, and 0.31 cm, respectively). Finally, results showed that germination percent, seed vigor index, germination speed and seedling length were the highest in dark \times 0 mM (74.66%, 2.54, 2.35 seeds/day and 3.4 cm, respectively) and were the lowest in light \times 300 mM (1.33%, 0.01, 0.02 seeds/day and 0.3 cm, respectively).



FREE RADICAL SCAVENGING ACTIVITIES OF FOUR *SALVIA* SPECIES

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It is generally accepted that free radicals play an important role in the development of molecular damage, cell injury and pathological events. The radicals are implicated in the etiology of cancer, multiple sclerosis, Parkinson's disease, senile dementia, diabetes mellitus, Alzheimer's disease etc. A large amount of research has been carried out to find antioxidant drugs, which participate as radical scavengers in living organisms. Currently, there is an increasing interest in the antioxidant activities of natural compounds. *Salvia* species are rich in constituents that are known to be effective radical scavengers. The member of the genus are commonly used as herbal tea, flavoring agents and medicinal plants. The medicinal properties of this genus are mainly attributed to the presence of terpenoids and phenolic compounds. The aim of the study was to evaluate the *in-vitro* antioxidant and free radical scavenging (FRS) properties and determine the total phenolic content (TPC) of the methanol extracts obtained from aerial parts of four *Salvia* species (including *S. verticillata*, *S. virgata*, *S. palaestina* and *S. reuterana*).

The *in-vitro* FRS activities were spectrophotometrically evaluated by two different quantitative methods (DPPH[•] and ABTS^{•+} assays). The FRS activity of each extract was expressed as an IC₅₀ value (μg/mL) and calculated from the Log concentration-response curve. The TPC of each extract [as μg gallic acid equivalent/mg of extract] was determined by Folin-Ciocalteu method and calculated from the standard curve of gallic acid. The results were statistically compared by one-way ANOVA to see the significance.

All examined extracts had antioxidant activities in both methods. *S. verticillata* exhibited the strongest activity as a DPPH[•] scavenger [IC₅₀ = 134.1 μg/ml (*P* < 0.001)]. On the other hand, all the extracts were active in the ABTS^{•+} assay and they did not show any significant difference in this method. *S. verticillata* showed the highest TPC [(148.59 ± 1.77 μg/mg (*P* < 0.001))]. A high correlation was found between the both antioxidant activities and the TPCs of the extracts [*r*² = 0.9443 (for DPPH[•] assay) and *r*² = 0.7918 (for ABTS^{•+} assay)].

A STUDY ON THE ANTIBACTERIAL ACTIVITY OF ETHANOLIC AND METHANOLIC EXTRACTS OF *PLANTAGO MAJOR* L.

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Plantago major is a perennial plant belonging to Plantaginaceae family. Phytochemical studies on *P. major* showed that several flavonoids like plantagin and homoplantagin. The plant is used as folk medicine due to their antimicrobial properties in some countries. The aim of this study was evaluation and comparing the antibacterial activity of methanolic and ethanolic extracts of *P. major* L. Against some bacterial pathogens [1, 2]. Plants were collected from Khuzestan ranges. Then ethanolic and methanolic extracts were prepared using 1g of dried plant powder and 10mL of 80% ethanol or methanol. Sterile blank discs were saturated with (100, 200, 400 and 600 mg/ml) concentrations of these extracts and Antibacterial activity of extracts was assessed using standard disc diffusion method against some pathogenic bacteria. A lawn culture of test bacteria with 0.5 McFarland turbidity prepared on Muller-Hinton agar and discs were placed on lawn cultures and incubated at 37°C for 24h. Simultaneously discs containing standard antibiotics were placed on cultures. After incubation the inhibition zone diameter around each disc was measured in millimeter [3, 4]. Different concentrations of both ethanolic and methanolic extracts of this plant showed significant antibacterial activity against some gram-positive bacteria *Staphylococcus aureus* (20mm) and *Bacillus cereus* (18mm) and also gram negative-bacteria *Escherichia coli* (17mm) and *Proteus mirabilis* (10mm). Based on these results it can be suggested that *Plantago major* is an effective antibacterial plant that have this potential to be used as a new source for antibiotic discovery against *S. aureus*, *B. cereus* and *E. coli* infections.

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A STUDY ON THE ANTIBACTERIAL ACTIVITY OF ETHANOLIC AND METHANOLIC EXTRACTS OF *SATUREJA HORTENSIS* L.

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Aromatic plants are known as one of important sources of antimicrobial agent. The genus *Satureja* L. (savory, *saturei*) includes more than 30 species belonging to the family Lamiaceae. *Satureja hortensis* L. produce antimicrobial secondary metabolites and essential oils as a part of their normal program of growth or in response to pathogens attack or stress condition. The aim of this study was evaluation and comparing the antibacterial activity of methanolic and ethanolic extracts of *S. hortensis* L. Against some bacterial pathogens [1, 2]. Plants were collected from farmland in Ahvaz, Khouzestan. Then ethanolic and methanolic extracts were prepared using 1g of dried plant powder and 10mL of 80% ethanol or methanol. Sterile blank discs were saturated with (100, 200, 400 and 600 mg/ml) concentrations of these extracts and Antibacterial activity of extracts was assessed using standard disc diffusion method against some pathogenic bacteria. A lawn culture of test bacteria with 0.5 McFarland turbidity prepared on Muller-Hinton agar and discs were placed on lawn cultures and incubated at 37°C for 24h. Simultaneously discs containing standard antibiotics were placed on cultures. After incubation the inhibition zone diameter around each disc was measured in millimeter [3, 4]. Different concentrations of both ethanolic and methanolic extracts of this plant showed considerable antibacterial activity against some gram positive bacteria *Staphylococcus aureus* (18mm), *Bacillus cereus* (16mm) and also gram negative bacteria *Proteus mirabilis* (14mm) and *Pseudomonas aeruginosa* (11mm). Based on these results it can be suggested that *S. hortensis* L. is an medicinal plant that have this potential to be used as a new source for antibiotic discovery against bacterial pathogens especially pathogens such as *Staphylococcus*, *Bacillus* and also for treatment of *Proteus mirabilis* infection.

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ZINC AND IRON NANO OXIDE INDUCED PRODUCTION OF HYPERICIN AND HYPERFORIN IN CELL SUSPENSION CULTURE OF *HYPERICUM PERFORATUM* (L.)

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Hypericum perforatum L. (St. John's wort) is an herbal remedy widely used in treatment of mild to moderate depression [1]. Hypericin and hyperforin, a photosensitive naphodianthrone, are believed to be the compounds responsible for reversing the depression symptoms [2]. Hypericin and hyperforin production have been induced using elicitors in cell cultures of *H. perforatum* [3]. In the present study the effect of zinc and iron nano oxides at different concentrations (0, 50, 100, 150 ppb/30 ml culture) were investigated for hypericin and hyperforin production in *H. perforatum* cell suspension culture. Detection and identification of hypericin and hyperforin was carried out by high performance liquid chromatograph method. The highest hypericin and hyperforin production were observed in media supplemented with 100ppb zinc and iron nano oxide. Zinc and iron nano oxide enhanced hypericin production (11.18 and 7.87 $\mu\text{g g}^{-1}$ DW, respectively) 3 and 13-fold, respectively, higher than that of the control. A dramatic increase in hyperforin production was achieved after exposure to zinc and iron nano oxide (195.62 and 217.45 $\mu\text{g g}^{-1}$ DW, respectively) 5 and 12-fold, respectively, higher than that of the control. These observations suggested that nanoparticles could be introduced as an appropriate candidate for elicitation studies of *in vitro* secondary metabolites production.

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TOTAL PHENOLIC CONTENT, FLAVONOIDS, OLIGOMERIC PROANTHOCYANIDINS OF DATE PALM (*PHOENIX DACTYLIFERA* L.) (VAR. DEYRY) FRUIT AND SEED

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Date palm (*Phoenix dactylifera* L.) is from Palmae family. Its fruits are used in some traditional medicines such as: cold, back pain. The seed powder is also used in some traditional medicines such as: astringent in intestinal troubles, treating diarrhea and renal stones. Date fruits have anti-cancer, anti tumor, gastric protector, anti inflammation and anti mutation effects. Here, the antioxidant capacity of methanolic and aqueous extracts of Date fruits and seed were investigated.

Date fruits were collected from Abadan in Khuzestan in Iran. By maceration method with methanol and water solvents, extracts were obtained. Total phenolic content, flavonoids and oligomeric proanthocyanidins of two extracts were also determined.

The maximum amount of phenolic compound was observed in Date seed aqueous extraction (173.51 mg acid tannic /1g extraction). The maximum amount of flavonoids compounds was observed in Date seed methanolic extraction (0.57 mg Rutin /1g extraction). The maximum amount of oligomeric proanthocyanidins compounds was observed in Date seed methanolic extraction (0.22 mg Cyanidin chloride /1g extraction).

Total phenolic content, flavonoids and oligomeric proanthocyanidins had highest amount in the seed methanolic extract.

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MEDIA OPTIMIZATION FOR *IN VITRO* CALLOGENESIS AND ORGANOGENESIS OF *HYPERICUM PERFORATUM* (ST. JOHN'S WORT)

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Hypericum perforatum L., known as St. John's wort, is an important tradition medicinal plant native to Europe but which is grown worldwide for commercial purposes [1]. *H. perforatum* has gained international popularity mainly for treatment of depression and wound healing [2]. In this study the effect of different levels of growth regulators (picloram, 2,4-D and BAP) and explants type (root, stem and leaf) were examined on callogenesis and organogenesis of st John's wort with factorial experiment design on the basis of completely randomized design with five repeats and five explants. The explants were obtained from 30 days plantlets and transferred to media supplemented with picloram, 2, 4-D (0, 0.5, 1, 2 mg l⁻¹) and BAP (0, 0.4, 0.8 mg l⁻¹). Samples were kept in the growth chamber in the darkness condition at 23 °C. After 28 days, the interactions between explants types and hormone levels were investigated. The significant effect at the 1 percent probability was observed between treatment levels of 2, 4-D, picloram, BAP and its interaction (2, 4-D * BAP) (picloram * BAP) for the calluses size and shoot numbers. The highest numbers shoots (16 shoots) were achieved with the stem explant treated by 0.4 mg l⁻¹ BAP. The highest callus size (5 mm) was observed in media containing 0.5 mg l⁻¹ picloram and 0.4 mg l⁻¹ BAP and stem explants.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF SEED INOCULATION WITH BIOLOGICAL FERTILIZERS ON SOME TRAITS OF *THYMUS PUBESCENS* BOISS

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Low input agroecosystems and novel natural recourse management methods are getting more and more important to reach the sustainable agriculture. Moreover, biofertilizers are used in order to decrease the chemical fertilizers application and increase yield. In order to investigate the effect of seed inoculation with biofertilizers (no inoculation, a₁; inoculation with *Glomus intraradices*, a₂ and inoculation with *Glomus moosae*, a₃) on morphological traits and yield of *Thymus pubescens* Boiss, this research was conducted in a randomized complete block design with three replications in Alborz Research Station, Karaj, Iran, in 2011. Analysis of the variances indicated that inoculation significantly affected canopy, small and large canopy diameters, the number of tillers, and the number of lateral stems, plant height and full flowering shoot yield ($P \leq 0.01$). Mean comparison showed that inoculation with *Glomus intraradices* was the best treatment. That highest full flowering shoot yield (1409.4 kg/ha) belonged to *Glomus intraradices* inoculation and the lowest full flowering shoot yield (787 kg/ha) belonged to the control.

EVALUATING DILL (*ANETHUM GRAVEOLENS* L.) SEED AND ESSENTIAL OIL YIELD IN DIFFERENT PLANTING DATES AND DENSITIES

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To evaluate the effects of planting dates and densities on yield and quality of dill, this experiment was conducted in 2010 at Alborz Research Station, Karaj, Iran. The study was conducted in split plot in the form of a randomized complete block design with three replications. The main factor was planting date (four dates with intervals of 20 days, beginning from March 11th) and the sub factor was planting density (5, 7, 11 and 22 plants/m²). Analysis of the variances indicated that planting date significantly affected seed yield, the number of inflorescences on the main stem, plant height, essential oil yield and biologic yield ($P \leq 0.01$), and essential oil content ($P \leq 0.05$). Moreover, planting density significantly affected seed yield, the number of inflorescences on the main stem, the number of lateral branches, plant height, essential oil yield, biologic yield, essential oil content and the longest internode ($P \leq 0.01$). The interaction of planting date \times planting density had also a significant effect on seed yield, the number of inflorescences on the main stem, plant height and biologic yield ($P \leq 0.01$). Mean comparison showed that the first planting date gave the highest seed yield (182.4 kg/ha) and the last (fourth) one gave the lowest seed yield (84.15 kg/ha). Moreover, the lowest essential oil percent (1.44%) was achieved in the last planting date and the highest essential oil yield was achieved in the first date (29.91 kg/ha).



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



A SURVEY OF THE EFFECT OF HARVEST TIME AND DRYING METHODS ON THE AMOUNT OF CITRIC ACID, ANTHOCYANINS OF *HIBISCUS SABDARIFFA* IN IRANSHAHR CONDITIONS

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Hibiscus tea or Mecca tea (Roselle) with the scientific name of *Hibiscus sabdariffa* L. of the family Malvaceae. An annual herb branched, leaves alternate with 3-7 lobes, and the edge of leaves are tooth like, large flowers with a short tail, and fruits are surrounded by fleshy sepals. This is a descriptive cross-sectional study. A community for this project consisted of three farms (A, B, C) chosen in 1389 (2010) in the city of Dalgan, 130 Kilometers West of Iranshahr. Considering that the predominant method of drying hibiscus tea sepals is done in sunlight. With applying the method of drying in the shade and comparing that with sunlight conditions tried to achieve a proper method. The operation was performed to take the samples on three different harvest dates to assess the effect of time on the amount of active ingredients. The combination of these two indicators, namely anthocyanins and citric acid were measured in each sample. In this study, 54 samples of hibiscus tea sepals from the three areas on three different harvest dates were collected and dried in sunlight and shadow conditions mean Anthocyanins and citric acid in dry conditions were 0.53% and 18.8% and in sunlight conditions were 0.5% and 18.2% respectively. Results did not show significant differences between the percentages of the anthocyanins and citric acid from the two methods. Mean anthocyanins in the first harvest date was 0.47%, and on the second and third harvest dates were 0.53%, the amount of citric acid from three different harvest dates turned out to be in the order of 16.6 and 19.4 and 19.5 percent. ANOVA and Tooky test indicated a significant difference on the first harvest date compare with the second and third harvest date.

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COMPARATIVE STUDY OF ANTIMUTAGENIC AND ANTICARCINOGENIC EFFECTS OF TWO SPECIES OF CUCURBITA GENUS SEEDS (*CUCURBITA PEPO VAR. STYRIACA & CUCURBITA MAXIMA*)

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Currently cancer is considered as one of the main causes of mortality in the world. Many chemicals in our environment can cause genetic mutations and are potentially responsible for millions of cancer-related deaths. The scientists are nowadays looking for food materials which can potentially prevent cancer occurrence. Seeds of pumpkin contain of phytoestroles, cucurbitacin, E-vitamin and minerals (Se, Cu, Fe), in order to pumpkins is used as anti-inflammatory and treatment urinary tract irritation and benign prostatic hyperplasia (BPH). The aim of this research was to examine and compare antimutagenicity and anticarcinogenic effects of methanolic and *n*-Hexane extracts of two species *Cucurbita* genus seeds (*Cucurbita Pepo Var. Styriaca & Cucurbita Maxima*) by a standard reverse mutation assay (Ames Test). For performing Ames Test salmonella typhimurium TA100 strain was chosen based on the fact that it had a specific mutation in the histidine operon, requiring histidine from a foreign source to ensure its growth. The mentioned strain gives rise to reverted colonies exposing to carcinogen substance (Sodium Azide). Furthermore, by adding rat liver microsome (S9), the anticarcinogenic effect of the extracts was proved. The results revealed that the *n*-Hexane extracts of *C. Pepo var. styriaca* seeds in the presence and absence of S9 inhibited sodium Azid mutagenesity, 58% , 62% respectively, but *n*-Hexane extracts of *C. Maxima* seeds revealed less than 40% inhibitory percentage decrease in antimutagenicity and anticarcinogenicity efficiency and methanolic extracts of them have least effect in comparison to *n*-Hexane extracts. Therefore *n*-Hexane extracts of *C. Pepo var. styriaca* seeds have higher antimutagenesity and carcinogenesity effects in comparison to *n*-hexane extracts of *C. Maxima*. and methanolic extracts of them [1-3].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



INVESTIGATING THE RELATIONSHIPS BETWEEN MORPHOLOGIC AND PHYSIOLOGIC FEATURES AND SOME MINERAL NUTRIENTS OF CAMPHOR (*CAMPHOROSMA MONSPELIACA* L.)

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Correlation studies, using factor analysis, stepwise regression and path analysis are multivariate analytical methods that make it possible to investigate the relationships between yield, morphological and physiological features. In this research, camphor (*champhorosma monspeliaca* L.) was collected from natural habitats at full flowering stage by using nine plots. Morphological features of 20 to 40 plants such as plant height, the number of tillers, canopy diameters, total shoot yield and full flowering shoot yield were measured. Physiological features such as chlorophyll content, soluble sugars, proline, sodium, potassium, magnesium, calcium, chlorine and iron were measured in the taken samples. The result of correlation between the measured traits showed that total shoot yield was positively correlated to full flowering shoot yield ($r=0.97^{**}$), the number of tillers ($r=0.94^{**}$), canopy diameter 2 ($r=0.83^{**}$), total chlorophyll 1 ($r=0.79^*$), total chlorophyll 2 ($r=0.77^*$), chlorophyll a ($r=0.78^*$) and chlorophyll b ($r=0.77^*$). However, total shoot yield was negatively correlated to root length ($r=-0.74^*$), root yield ($r=-0.83^{**}$), soluble sugars ($r=-0.76^*$), proline ($r=-0.94^{**}$) and chlorine ($r=-0.77^*$). Flowering shoot yield was positively correlated with the number of tillers ($r=0.97^{**}$), canopy diameter 1 ($r=0.77^*$), canopy diameter 2 ($r=0.97^{**}$) and total chlorophyll 1 ($r=0.74^*$), and was negatively correlated to root yield ($r=-0.77^*$), soluble sugars ($r=-0.97^*$), calcium ($r=-0.72^*$) and chlorine ($r=-0.81^{**}$). Soluble sugars content was positively correlated to proline ($r=0.83^{**}$), magnesium ($r=0.88^{**}$), calcium ($r=0.90^{**}$) and chlorine ($r=0.91^{**}$). Proline was positively correlated to magnesium ($r=0.79^*$), calcium ($r=0.79^*$) and chlorine ($r=0.87^{**}$). The result of factor analysis showed that the first and the second prinis (72.16 and 24.97% variation, respectively) contributed to more than 97% of the total variation. The result of stepwise analysis on the dependent variable (full flowering shoot yield) showed that five traits (total shoot yield, iron, canopy diameter 2, chlorine and canopy diameter 1) entered to the model, respectively. The result of path analysis indicated that total shoot yield had the highest direct positive effect on full flowering shoot yield.

STUDY ON THE EFFECT OF USING DIFFERENT LEVELS OF HARMEL SEEDS (*PEGANUM HARMALA*) ON SOME BIOLOGICAL INDICES OF RAINBOW TROUT (*ONCORHYNCHUS MYKISS*)

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One of purposes of using medicinal plants in the diet of animals is to improve growth indices and identify growth promoters for organic aquaculture practices. Harmel is a plant having antiinflammatory and anticancer agents. Harmal seeds was used at five inclusion levels (100, 200, 300, 400 and 500 ppm) together with control diet in the isonitrogenous and isoenergetic diets of juvenile rainbow trout (3.1 ± 0.5 g) for 56 days. Growth performance (specific growth rate) and immunological indices (lysozyme and complement) were measured. Results showed that using more than 300 ppm harmal seed decreased the final weight (8.11 ± 0.5 g) compared to control group (10.42 ± 0.8 g). Specific growth rate fish fed the diets containing 400 ppm (2.8%/day) and 500 ppm (2.4%/day) of harmal seed decreased significantly ($P \leq 0.05$) compared to control diet (4.1%). Immunological indices including lysozyme and complement levels of the serum of fish fed the diet containing 400 ppm harmal increased ($8.2 \mu\text{g/ml}$ and 10.1 unit/ml, respectively) compared to control diet ($6.2 \mu\text{g/ml}$ and 8.0 unit/ml, respectively). Based on the results, using harmal seed at 300 ppm in the diet of rainbow trout was possible. Knowing neutraceutical and a functional property of native plants is an important area in fish nutrition in near future [1].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



DISTRIBUTION OF *TEUCRIUM POLIUM* IN OAK FORESTS OF YASUJ

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Teucrium polium belongs to the family *Lamiaceae*. The growth form of this species is shrub. Also this species is one of the medical plants in Zagros forests, because genus of *Teucrium* is very rich in phenolic compounds with very strong biological activity. The importance of this genus and family in food industries lies also on the fact that many species show antimicrobial, antioxidant and antifungal activities, rendering them useful as natural preservative ingredients [1, 2]. So this investigation was carried out to understand some ecological characteristics of *Teucrium polium* and using them in abundant cultivation and applying in medicinal industries and prevent the natural habitats from destroying in Yasuj forests. To achieve this purpose, 49 plots in different vegetation sites in 925 ha of teaching and research forest of Yasouj University were recorded. The area of each plot was 450 m² and name and frequency of all species in each plot with using of method braun-blanc were recorded. Also longitude, latitude, slope, topography, aspect, tree cover, grass cover, gravel, litter, depth of humus in each plot were recorded. Analyze of data were done using spearman correlation and discriminate analysis. Results showed that presence of this species has significant correlation with some species such as *Alium sp.*, *silene sp.* and *cichorium intybus*. Also this species presented in stony sites [3]. Also this frequency of this species had significant correlation with slope. This study showed this species can establish in degraded forests, specially a progressive secondary succession [4]. It can be concluded that planting of this species in destroyed forests can help to regeneration of forest and it can be a source of income for local people in these forests.

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ECOLOGY OF *STACHYS LAVANDIFOLIA* IN PROTECTED AREA OF DENA

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The flower and leaf parts of *Stachys lavandulifolia* Vahl (*Lamiaceae*) are traditionally used to energizer, stomach upset and appetizing also it used to treat various skin disorders, antimicrobial and anti-inflammatory [3]. The growth form of this species is hemipterophyte and this species is well-established in protected area of Dena. On the other hand, today according to the World Health Organization reports, as many as 80% of the world's people depend on traditional medicine for their primary health care needs. There are considerable economic benefits in the development of indigenous medicines and in the use of them [1]. Because of regional potential for growth, cultivation and use of medicinal plants, aim of this study was to identify vegetation site of this species in forest region of protected area of Dena. For this purpose, 50 plots (450 m²) in different vegetation sites from 1900 to 2800 m.s.l. were designed. Then taxonomic identification of plant materials was determined using by flora of Iran. Frequencies of all species in each plot were recorded with using of method braun-blanc. Also longitude, latitude, slope, topography, aspect, tree cover, grass cover, gravel, litter, depth of humus in each plot were recorded. Analyze of data were done using spearman correlation and discriminate analysis. Results showed that there is 147 grass species in study area and this species was recorded in 30% of all plots. Also presence of this species was significant with 8 other species. The frequency of this species was higher in sites with higher grass cover and lower gravel. But there was not any relation between presence of this species with other ecological parameters such as altitude, aspect and etc. This study showed that this region has a great potential for producing this medicinal plants species. Also we can try to establishment in other sites of this region for using of it for traditional medicine or for sales.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ESSENTIAL OILS COMPOSITION OF *DOREMA AMMONIACUM* .D.DON

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Dorema ammoniacum from **Apiacea** family (Vasha in Persian), *Dorema ammoniacum* species is one of the industrial plant endemic of Iran that has essential oils. This Plant grows wild in central regions of Iran. The aim of this research was investigation chemical composition of essential oils of *Dorema ammoniacum*. The aerial parts and stem of *Dorema ammoniacum* were collected in Seed-yielding stage from Abadeh, Fars province. The essential oils were extracted by hydro-distillation and analyzed by a combination of GC/MS. Forty-seven constituents were characterized representing 99.9% of the total component which were detected. Hexadecanal (11.060%), α -Cadinol (6.626%), Sesquicineol-2-one (6.613%), Ethyl linoleate (6.265%), Ledol (5.134%), γ -Eudesmol (4.363%), 2-pentadecanone (4.036%), Z-11-Hexadecenal (3.892%), β -Eudesmol (3.013%) were found to be the major constituents of the oil. Hexadecanal (11.060%), α -Cadinol (6.626%) and Sesquicineol-2-one (6.613%) as dominant components (24.29%).

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ANATOMICAL PROPERTIES OF RESIN DUCTS IN ATLAS MASTIC SEEDLINGS
ALTER UNDER WATER SHORTAGE

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Mastic gum, an exudate originate from resin ducts in phloem of Atlas mastic tree [1], has many pharmacological properties such as anti-bacterial, anti-fungal, anti-inflammatory and antinociceptive activities [2] and its application as chewing gum has a long history. Drought stress, especially in Mediterranean regions, is a matter of great concern that mostly restricts plant productions. Despite some efforts to understanding physiological responses of this species to drought [3, 4], there is no evidence about the effects of drought stress on resin ducts of mastic tree as origin of resin and gum. In this study the anatomical variations of resin ducts and its surrounded epithelial cells in 3 year old mastic seedlings of *Pistacia atlantica* Desf. has been investigated under progressive water deficit. Plants were exposed to gradually water deficit for two weeks in pot condition and maintained in 100, 60, 40 and 20 % of soil field capacity. Finally, after samples preparation, ducts frequency, lumen area, perimeter, minimum and maximum diameter and thickness of epithelial layers were determined in their stem cross sections. Results revealed that resin ducts frequency increased by increasing water shortage but thickness of epithelial layers and lumen size of ducts decreased under severe drought condition. It concluded that severe drought condition, possibly by inducing some drought response hormones like ethylene, increases duct frequency [5] but total hydraulic conductance of channels decreased due to the narrowing their lumen area. It can be also hypothesized that some short periodic drought can excite resin duct formation and subsequent rewating can conducted to improving product quantity.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF MICROWAVE RADIATION ON SEED GERMINATION AND SEEDLING GROWTH
OF FENNEL (*FOENICULUM VULGARE MILL.*)

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The objective of the present study was to investigate the effect of microwave radiation on seed germination and seedling growth of Fennel. For this target Fennel seeds affected by LG model microwave set, with low power, 180 watt, and high power, 360 watt, and with three times: 30, 60, 90 second. Number of seeds with out to exposure under microwave radiation spot for control, 3 day after implant, counted germinated seeds and 12 day after of seeds implant, parameters of shoot length, root length, fresh weight, dry weight, germination percent, germination index, seedling stamina index and germination speed index measured and compared with together and with control samples. The parameters extents are differences among treatments and microwave radiation increases some of these parameters until to limit range and as increase in set power or time treatment, decrease parameters extents. The costs of this, perhaps with fennel seeds exposed to microwave radiation stimulates seed germination and increase the amount and speed of its growth and thus increase production of this valuable and joinery plant [1-3].

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EFFECTIVE TECHNIQUES TO BREAK SEED DORMANCY AND STIMULATE SEED
GERMINATION IN *MYRTUS COMMUNIS L.*

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Myrtus communis L. (Myrtaceae) is an important medicinal plant in traditional medicine and cosmetic industry. Its germination percentage and rate due to dormancy is low. Because of medicinal importance of *M. communis*, propagation of the species by seed was investigated and the best treatment for germination induction was determined. Seed priming is one of the common techniques of seed enhancement. This study was performed to determine the best treatment for seed dormancy breaking. To achieve this goal, seeds of *M. communis* exposed to different mechanical and chemical treatments including untreated seeds (control), mechanical scarification with sand paper, sulfuric acid 80%, alcohol 70%, nitric acid 3% and H₂O₂ 1%. Results showed significant difference (P<1%) among mentioned treatments for all traits. Mechanical scarification and sulfuric acid 80% significantly was increased germination percentage and seed vigor. Mechanical scarification significantly increased germination rate than other treatments. Improvement of the root-shoot ratio in all treatments was more than control. Results indicated that germination of *M. communis L.* seeds mechanically scratched significantly increased. So, hard coat is a reason of seed dormancy and as one physical barrier against embryo or radical growth. It inhibits absorption of water and gas exchanges. (1, 2, 3, 4)

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECTS OF HARVESTING TIME AND NITROGEN FERTILIZATION ON ESSENTIAL OIL AND SOME MORPHOLOGICAL CHARACTERISTICS OF PEPPERMINT (*MENTHA PIPERITA* L.)

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Peppermint (*Mentha piperita* L.) is one of the highly demanded aromatic medicinal plants and its essential oil is extensively used in the food, flavor and pharmaceutical industries. It has been known that agronomical factors have a great effect on both quality and quantity of essential metabolites. For this reason, it is necessary to determine optimum levels of agronomical factors affecting plant growth and production. In order to study the effects of harvesting time and nitrogen fertilization on essential oil and some morphological characteristics of Peppermint a field experiment was conducted in research farm of Barij Essence Pharmaceutical Company in around of Kashan. The experimental design was a randomized complete blocks in a split-plot arrangement with three replications in 2009. Main factors were three levels of nitrogen fertilizer (100, 200 and 300 Kg/ha) and sub factors were three harvesting time (bud formation period, %10 flowering and %50 flowering). Aerial parts of the plant were subjected to Hydro-distillation for 3 h using a Clevenger-type apparatus to produce essential oil. Nitrogen fertilizer had significant effect on plant height, bud length, Lateral shoot and essential oil content at the first and second harvest ($p < 0.05$) and very significant effect ($p < 0.01$) on other measured parameters except leaf length, which was not significant. The result of mean comparison showed that the highest plant height, bud length, Lateral shoot, fresh herb weight, fresh weight of 100 leaf and essential oil content at the first harvest were obtained with the N rates of 200 and 300 Kg/ha. The highest essential oil content at the second harvest was obtained with the N rate of 200 Kg/ha. The highest Leaf width was obtained with the N rates of 100 and 200 Kg/ha. Time of harvest had significant effect on lateral shoot and fresh weight of 100 leaf ($p < 0.05$). Its effect on other parameters was very significant ($p < 0.01$) except leaf length. The maximum leaf width and bud length, were obtained at the %10 flowering stage. The highest plant height and lateral shoot were obtained at the %50 flowering stage. The highest fresh herb weight, fresh weight of 100 leaf and essential oil content at the second harvest were obtained at the bud formation period stage. The highest essential oil content at the first harvest was obtained at the bud formation period and %10 flowering stages [1,2].

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HEAVY METALS (LEAD AND CADMIUM) IN MEDICINAL HERBAL TABLETS IN IRAN

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WHO has emphasized the need for quality assurance of herbal products, including testing of heavy metals [1] due to increased toxicity reports. The accumulation of heavy metals in medicinal plants have been reported to depend on climatic factors, plant species, air pollution and other environmental factors [2].

The aim of this research was to determine the heavy metal content of some popular medicinal herbal products in Iranian market. Samples were analyzed, after nitric digestion, for the content of cadmium and lead, by the atomic absorption Spectrophotometry. From the results of the study Lead and cadmium were present in all the herbal medicines examined. The concentrations of Lead and cadmium were higher than the maximum permissible daily levels in majority of these herbal medicines but the quantities of Pb and Cd were well below of provisional Tolerable Weekly Intake (PTWI). However, certain group of patients such as elderly with cardiovascular problems and kidney deficiency who may intake these herbal products for long term should be extra cautions as they are more susceptible to toxicities.

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EFFECT OF ETHANOL, METHANOL AND MEDICINAL PLANTS ESSENTIAL OILS AS NOVEL AGENTS TO IMPROVE VASE-LIFE OF LILIUM FLOWERS

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The production of Liliium flowers has been rapidly increasing in the world. In this research effect of different concentrations of ethanol (4, 7, 10%), methanol (4, 7, 10%) as pulse treatments and some medicinal plants essential oils (50 or 100 mg L⁻¹ lemon balm (*Melissa officinalis* L.), thyme (*Thymus vulgaris* L.) and black cumin (*Bunium persicum* (Boiss.) B. Fedtsch)) on flower longevity, solution uptake, fresh weight and SPAD value as a measure of leaf greenness of *Lilium ledebouri* were analyzed. Results showed alcohol treatments had no positive effect on increasing vase life of Liliium. Applying essential oils could extend the vase-life. The greatest longevity of vase life was related to 50 mg L⁻¹ of lemon balm essential oil treatment and approximately it improved inflorescence cut vase life more than 2 days longer than control treatment. The greatest solution uptake and decrease in fresh weight were seen in 100 mg L⁻¹ thyme essential oil and 100 mg L⁻¹ lemon balm essential oil, respectively. Essential oils could not maintain SPAD value in higher amount than control treatment but these compounds particularly 50 mg L⁻¹ lemon balm, thyme and black cumin essential oil are useful for increasing vase life of Liliium [1- 4].

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COMPARING THE EFFECT OF FERTILIZER BIOLOGICAL THIOBACILLUS AND SUPERABSORBENT FUNCTION ON THE MORPHOLOGICAL SPECIES OF THYME (*THYMUS VULGARIS*, *THYMUS DAENENSIS*)

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Essential oil plants have an important role in human life and in Iran have a long history [1]. Thyme is one of the most important medicinal plants. But the seeding and the transplanting are the weak part of production. The biological fertilizer and super absorbent study is to increase the growth and thyme plant performance in Iran. In this study *Thyme* herb seeds were planted in pots and the biological thiobacillus and super absorbent were mixed with the soil. Two level of thiobacillus (thiobacillus treatment and without thiobacillus treatment) and tree level of super absorbent (0, 0.5, 1) gram per liter soil were used with factorial block randomized complete with three replications. And after germination the morphological growth were measured. The result showed that the plant height, number of leaves and number of lateral branches were significant at 1% and grown diameter at 5% and *Thymus vulgaris* species showed the highest increase in the proportion with *Thymus daenensis*. Thiobacillus alone did not make any changes but super absorbent with 0.5 gram per liter soil was significant at 1% level. The maximum height and the number of leaves were produced. Super absorbent with 0.5 gram per liter soil and thiobacillus were significant at 1 level for the number of leaves. Finally Thiobacillus and super absorbent increased the lateral branches, number of leaves and the grown diameter, respectively (68%, 83%, and 45%) and were significant at 1 level with 0.5 gram per liter soil.

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16, 17 May 2012
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STUDY ON THE ROOT FORMATION POSSIBLE FROM LEAF CUTTING OF *ALOE VERA*. L BY USING OF PLANT GROWTH REGULATORS AND DIFFERENT CULTURE MEDIA

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Aloe vera. L is a plant from Liliaceae family, native of warm region of South America and Australia, with valuable medicinal effects. In this study propagation of this plant from leaf cutting considered that is not a common way of propagation of this plant. Treatment was different concentration of IBA and NAA with different culture media. The experiment was down to factorial experimental design on complete randomize blocks that different concentration of IBA and NAA defined as the A factor and different medias defined as the b factor. Each treatment has three replication with ten explants in each replication. Cocopeat, Perlit and sand ware culture media and IBA (0, 200, 2000 PPM), NAA (0, 200, 2000PPM) and IBA (100PPM) combine with NAA (100PPM), IBA (1000PPM) combine with NAA (1000PPM) was hormonal treatments. Reciprocal effects of Hormone and media show significant effects at 1% level on percentage of root formation, number and length of roots. 1000 ppm IBA combine with 1000 ppm NAA on cocopeat media show maximum percentage of root formation and least of root formation observed on sand media with no plant growth regulators.

CHANGE ON YIELD AND ESSENTIAL OIL CONTENT OF *MENTHA PIPERITA*. L AFFECTED BY NITROGEN TYPE AND CONCENTRATION OF FERTILIZER

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Mentha piperita. L is one of the aromatic and medicinal plants from Lamiaceae family that usually show positive reflection to nitrogen. In this research effect of different concentration of urea and Ammonium nitrate on yield and essential oil content of plant in Jiroft province studied. Experiment was down to factorial experimental design on complete randomize blocks that urea levels defined as a factor and Ammonium nitrate levels defined as b factor. Result show that different levels of urea has significant effects at %1 level on fresh and dry weight and percentage of essential oil content and show significant effects at 5% on number of leaf , leaf length and height of shoots. Ammonium nitrate levels show significant effects at 1% level on fresh and dry weight and on essential oil content and show significant effect at 5% level on number of leaf, leaf length and height of shoots. Reciprocal effects of treatments show significant effects on 5% on fresh and dry weight, leaf length and on essential oil content. Maximum of fresh and dry weight and essential oil content observed from of urea (75 Kg/ha) combine with (150 Kg/ha) ammonium nitrate and maximum of length of leaves observed by using urea (75 Kg/ha) combine with (75 Kg/ha) ammonium nitrate.



TOTAL PHENOLIC CONTENTS OF THE CALLUSES FROM *LYTHRUM SALICARIA* L. IN DIFFERENT TREATMENTS

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The seeds of *Lythrum salicaria* L. (Lythraceae), collected from Lahijan city (Gilan province) in the north of Iran, were cultured in Murashige and Skoog medium (MSM) with a supplement, gibberellin, to germinate. Segments of seedling were transmittted to MSM containing different concentrations of plant growth regulators, 2, 4-dichlorophenoxyacetic acid (2, 4-D) and 6-benzylaminopurine (BAP), for callus development. This study indicated that the callus formation in MSM supplemented with various concentrations of 2,4-D and BAP were 70-100%, except for media contained only 2,4-D or 5 mg/L 2,4-D with 1 mg/L BAP and 0.1 mg/L 2,4-D with 2 mg/L BAP. No callus generation was observed in MSM with 5 mg/L 2, 4-D. The callus obtained from MSM with different hormone concentrations were analyzed for their contents of total phenols by using Folin- Ciocalteu reagent. The results expressed that gallic acid equivalent values in above mentioned treatments were varied from 32.68 to 264.08 µg GAE mg⁻¹. With regards to the results, MSM containing 1 mg/L 2,4-D + 1 mg/L BAP (288±13.7 µg GAE mg⁻¹), 1 mg/L 2,4-D + 2 mg/L BAP (264.08±2.02 µg GAE mg⁻¹) and 2.5 mg/L 2,4-D + 1 mg/L BAP (215.29±12.9 µg GAE mg⁻¹) were induced the higher phenolic contents generation. Phenolic contents of plant aerial parts (331±3.7 µg GAE mg⁻¹) and the callus which developed in MSM including 1 mg/L of both 2,4-D and BAP showed the same phenolic value with no significant difference.

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ANATOMICAL AND LATICIFEROUS STUDY OF EIGHT SPECIES OF SUBGEN. *CHAMAESYCE* RAF. (*EUPHORBIA*, EUPHORBIACEAE) IN IRAN

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Euphorbia is the second largest genus after *Astragalus*, and the largest genus in Euphorbiaceae with more than 2200 species occurring in all part of universe except in polars [6]. Some species of *Euphorbia* have been used in folk medicine over the centuries. The milky sap or latex of spurge is suggested to have a protective and defensive role in helping heal wounds [5]. The extract of this plant have anti-cancer, inhibition of HLV-1 multiplication, anti bacterial, viral and fungal effect [1, 3]. In a survey is determined that *E. prostrata* from subgen. *Chmaesyce* has antibacterial and antidiarrhea properties, and can be used as substituting therapy for bacterial diarrhea [4]. Latex of this species has also been known from ancient as an antidote to the Poison of the Rattlesnake [2]. Subgenus *Chmaesyce* has eight species in Iran. In this study, these eight species were surveyed from anatomical view. In leaf cross section, situation of laticifers was determined, and differences between species from leaf structure aspect and presence of laticifers were studied. Laticifers had been accumulated around the central vessel where they were more visible in middle of palsade paranchyme, in middle of bundle sheath cells and finally very under central vessel in abaxial side (between paranchyme or collanshyme layer), as lonely or in groups of tve.

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STATISTICAL ANALYSIS OF CORIANDER (*CORIANDRUM SATIVUM*) DRY MATER YIELD UNDER DROUGHT STRESS CONDITIONS

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Researches related plant response to water stress is becoming increasingly important, as most climate change scenarios suggest an increase in aridity in many areas of the globe [1]. Different statistical techniques have been used in modeling plants yield, including correlation, regression, path analysis, factor analysis, factor components and cluster analysis. Correlation coefficient is an important statistical procedure to evaluate breeding programs for high yield, as well as to examine direct and indirect contribution of the yield variables [2]. In the present study, 30 coriander seeds were sown in plastic pots containing 3.5 kg soils. Six weeks after sowing, the seedlings were treated by water stress (10 days without irrigation). Coriander plants were harvested 10 days after water stress treatment. Afterwards, characters such as plant height, leaf fresh weight, stem fresh weight, total fresh weight, leaf dry weight, stem dry weight and total dry weight were determined. Six statistical procedures including: simple correlation, path analysis, multiple linear regression, stepwise regression, factor analysis and cluster analysis were used to study the relationship between coriander dry matter yield and its components under drought stress conditions. Appropriate statistical analysis was done using SPSS package [3]. Results revealed that leaf and stem dry weight were the most effective variables influencing coriander dry matter yield based six statistical procedures. Based on the results, it is reasonable to assume that high dry weight yield of coriander plants under drought conditions could be obtained by selecting breeding materials with high leaf and stem dry weight. Results revealed that leaf and stem dry weight were the most effective variables influencing coriander dry matter yield. Based on the results, it is reasonable to assume that high dry weight yield of coriander plants under drought conditions could be obtained by selecting breeding materials with high leaf and stem dry weight.

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DETERMINING THE OPTIMUM GERMINATION PERCENT OF TWO AMARANTH CULTIVARS UNDER SALINITY (NaCl) STRESS

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Salinity is an important growth limiting factor and the increased salinity inhibits the germination of many plant seeds. To evaluate the germination of amaranth varieties under saline condition, this experiment was conducted in the Research Institute of Forests and Rangelands, Iran. The study was conducted in factorial in the form of a completely randomized design with three replications. The two factors of the experiment included amaranth variety (*Amaranthus hypochondriacus* L. var. Kharkofski and var. Cim) and salinity level (0, 100, 200, 300, 400 and 500 mM NaCl). Analysis of the variances indicated that variety significantly affected germination percent and seed vigor index ($P \leq 0.01$). Salinity significantly affected seedling length, radical length, plumule length and plumule / radicle ratio at $P \leq 0.01$ and germination percent and seed vigor index at $P \leq 0.05$. The interaction of variety \times salinity had also a significant effect on plumule / radicle ratio and seed vigor index ($P \leq 0.01$) and radicle length ($P \leq 0.05$). Mean comparison showed that var. Kharkofski had the highest seedling length (1.97 cm), plumule length (1.11 cm), radicle length (1.09 cm), germination percent (38%), plumule / radicle ratio (0.71) and seed vigor index (42.17). Among the salinity levels, 100 mM resulted in the highest seedling length (5.46 cm), plumule length (2.42 cm), radicle length (3.8 cm). Moreover, 400 mM salinity level had the lowest seedling length (0.06 cm), plumule length (0 cm) and radicle length (0.06 cm). Finally the control (0 mM) had the highest germination percent (99%) and 500 mM had the lowest germination percent (3%).



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECTS OF CINNAMON OIL FEEDING ON INTESTINE MICROFLORA COMPOSITION IN JAPANESE QUAIL CHICKS

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The aim of this work was to evaluate the effect of two levels of cinnamon oil (*Cinnamomum verum*) on intestine microflora composition in meat Japanese quail. Essential oils (EOs) are volatile oily liquids obtained from different plant parts. Plant extracts having been long recognized for their antibacterial, antifungal, antiviral and antioxidant properties. In vitro antimicrobial activity of several plant extracts (essential oils, basically) has been shown. Cinnamon extract has antimicrobial properties that are mainly related to its cinnamaldehyde content followed by eugenol and carvacrol contents. Therefore we used cinnamon oil in Japanese quail chicks diet consisted of a starter diet until day 21 and grower diet until day 35. One hundred and eighty one-day-old Japanese quail chicks were used in the experiment. Japanese quail chicks were allocated into three dietary treatment groups with four replicates, in a complete randomized design. The treatments were as follow: 1. Control (basal diet, without any added compounds), 2. C1 (basal diet+100 mg Cinnamon oil/kg diet), 3. C2 (basal diet+200 mg Cinnamon oil/kg diet). The data were analyzed using GLM procedure of SAS. At 35d, intestinal populations of lactobacilli, total aerobes and coliforms were enumerated in the small intestines. Lactobacillus populations were significantly higher ($P<0.05$) in the intestine of birds receiving C2 than in the birds given the control diet. Significantly lower populations ($P<0.05$) of coliforms were enumerated in the small intestine of birds fed C2 (200 mg Cinnamon oil/kg diet) than in the other dietary treatments, but the effect of cinnamon oil on intestinal total aerobes bacteria was not significant. The antimicrobial property is considered to arise mainly from the potential of the hydrophobic essential oils to push into the bacterial cell membrane, disintegrate membrane structures and cause ion leakage. *Coli form bacteria* is an indicator tool for intestinal performance, so cinnamon affects pathogenic bacteria by changing cell wall bacterial penetrability leading to pore formation and osmotic shock and leakage of cytoplasm and its active contents out-side the cell and it leads to their death. On the other hand, essential oils stimulate the growth of beneficial intestinal microflora, so it reduces the presence of Gram-negative bacteria like *E. coli* or *Coli form*. Thus, feeding 200 mg Cinnamon oil/kg diet might be beneficial in terms of the growth of various enteric pathogens[1].

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THE EFFECT OF CHEMICAL TREATMENTS ON GERMINATION TRAITS OF BITTER CUCUMBER "*CITRULLUS COLOCYNTHIS*"

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Bitter cucumber with scientific name *Citrullus colocynthis* is a herb from cucurbitaceae family which has strong laxative properties and is used to treatment diabetes, intestinal weak and liver disease [1]. Due to the hard and impervious shell of seed, this herb has a few germination [2, 3]. hence a research has been done in order to investigate the effect of treatments on vegetative traits of Aboojahl in 2010. The seed of this herb with an attendance consist of 20 mM vitamin C, 0.5 mM salicylic acid, %10 poly ethylene glycol and tree mixture treatments: acid sulfuric with water, sulfuric acid with 0.5 mM salicylic acid or concentrated sulfuric acid with %10 poly ethylene glycol, in tree time 15, 30, 45 minutes for sulfuric acid were applied. Then planted the seed for a week in a Petri dish and the desired traits were measured.

These experiments with completely randomized design with three replications were conducted in the laboratory of Agriculture Faculty, Shahid Bahonar University. According to the results keeping seeds in sulfuric acid during 45 minutes has less effect and this is due to bad effect of sulfuric acid on seed's germ that cause decreasing the percent of germination .

The results showed Significant differences between treatments were imposed, comparing the averages shows that the salicylic acid treatments has the most effect on percent of seed germination and polyethylene glycol had the most effect on speed of germination .

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF CHRONIC ADMINISTRATION OF *NIGELLA SATIVA* CONSTITUENT, THYMOQUINONE, ON LEARNING AND MEMORY OF DIABETIC RATS

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Chronic diabetes mellitus accompanies disturbances in learning, memory, and cognitive skills. With regard to antidiabetic and antioxidant activity of thymoquinone (TQ), the effect of its chronic administration on learning and memory of diabetic rats was investigated.

In this experimental study, male rats were divided into control, high dose TQ-treated control, diabetic, and low and high dose TQ-treated diabetic groups. TQ was administered i.p. at doses of 2.5 and 5 mg/kg one week after diabetes induction by streptozotocin for 5 weeks. For evaluation of learning and memory, initial (IL) and step-through latencies (STL) were determined at the end of study using passive avoidance test and alternation behavior percentage was obtained using Y maze.

STL significantly decreased in diabetic ($p < 0.01$) and TQ-treated diabetic groups ($p < 0.001$) and TQ treatment at none of the doses improved it. Alternation percentage was significantly lower in diabetic group relative to control ($p < 0.005$) and TQ-treated diabetic group (at a dose of 5 mg/kg) showed a significantly higher score in comparison with diabetic group ($p < 0.01$).

Although chronic treatment of diabetic rats with TQ could not enhance the capability of consolidation and recall in diabetic animals, but could improve spatial memory in diabetic animals.

ETHNOPHARMACOLOGY AND ANTIBACTERIAL ACTIVITY OF *FERULA GUMMOSA* BOISS. IN RAZAVI KHORASAN PROVINCE

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North Khorasan province with ecological variation has good potential for growth of many wild medicinal plants. *Ferula gummosa* Boiss. belongs to Apiaceae family, with locally known as "Barije", is one of the most important medicinal plants in stepic and desert region of Iran, which has been used long times ago in traditional uses as antiseptic, antispasmodic, anti-inflammatory and anti convulsant [1, 2]. In this research in many field observation ethnopharmacological data about medicinal parts and their activity of *Ferula gummosa* were obtained by the rural heales and the roots were collected in Firozeh Neishabour mountainous village in north of khorasan province. Dried powders of roots extracted by water and antibacterial properties were obtained by "Disk and Well diffusion" methods against 9 Gram positive and negative bacteria. Ethnopharmacological results showed that the root and gums of *F. gummosa* has been used in traditional medicine of this region as antiseptic, antispasmodic, anti-inflammatory, anti convulsant, epilepsy and analgesic to treat of headach, migrain, wound and ulcers. Antibacterial screening indicated that root extract have a good antibacterial activity against tested bacteria, especially in well methode and against Gram positive bacteria such as: *Staphylococcus aureous* with inhibition zone 28 mm and MIC 16.3 mg/ml was the most sensitive strain of bacteria, whereas *shigella dysenteria* with none inhibition zone was found to be the most resistant bacteria among of Gram negative bacteria. Therefore we offer to research about investigation effect of another solvent in antibacterial activity in different parts of *F.gummosa* and survey of their effecs in invivo and clinical models.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ANTIOXIDANT PROPERTIES AND FREE RADICAL SCAVENGING ACTIVITIES OF FOUR APIACEAN FRUITS

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It is well known that naturally occurring substances in higher plants have antioxidant activities. Recently, there has been increased interest in free radicals in biological systems and their roles as causative agents in a variety of chronic disorders. Accordingly, attention is being focused on the protective biochemical functions of naturally occurring antioxidants in the cells of the organisms containing them. This work was designed to evaluate the antioxidant and free radical scavenging activities of the essential oils obtained from four Apiacean fruits (including *Bunium persicum*, *Cuminum cyminum*, *Pimpinella anisum* and *Trachyspermum copticum*) in different test systems. All of these plants are used in food industry and Iranian's traditional medicine.

The *in-vitro* antioxidant and free radical scavenging activities were spectrophotometrically evaluated by three different quantitative methods (namely DPPH[•], ABTS^{•+} and linoleic acid/ β -carotene bleaching assays). The antioxidant activity of each essential oil was expressed as an IC₅₀ value (μ L/mL) and calculated from the Log concentration-response curve. The results were statistically compared by one-way ANOVA to see the significance.

All the tested essential oils exhibited concentration-dependent antioxidant and free radical scavenging activities. *T. copticum* showed the highest free radical scavenging activities in both DPPH[•] [IC₅₀ = 3.04 μ L/mL ($P < 0.001$)] and ABTS^{•+} [IC₅₀ = 0.083 μ L/mL ($P < 0.001$)] assays. On the other hand, *T. copticum* [IC₅₀ = 0.25 μ L/mL] and *B. persicum* [IC₅₀ = 0.24 μ L/mL] were the most active species in the β -carotene bleaching inhibition test.

BEHAVIORAL EVALUATION OF ANTINOCICEPTIVE EFFECT OF NIGELLA SATIVA-DERIVED THYMOQUINONE IN MALE DIABETIC RATS

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Nigella sativa and its derived thymoquinone exhibit clear antidiabetic and anti-inflammatory effects. This study was designed to investigate the antinociceptive effect of thymoquinone (TQ) in streptozotocin-diabetic rats using formalin test and hot tail immersion tests.

Rats were divided into control, high dose TQ-treated control, diabetic, sodium salicylate (SS)-treated diabetic, and high and low dose TQ-treated diabetic groups. TQ was administered i.p. at doses of 2.5 and 5 mg/kg one week after diabetes induction by streptozotocin for 5 weeks.

TQ treatment of diabetic rats reduced pain score in acute and chronic phases of the formalin test ($p < 0.05$). Meanwhile, SS administration significantly reduced pain score only at chronic phase of the test ($p < 0.01$). Regarding hot tail immersion test, diabetic rats showed a significant reduction in tail flick latency as compared to control ones ($p < 0.05$) and TQ treatment of diabetic rats slightly increased this latency relative to untreated diabetics but the existing difference was not statistically significant.

Taken together, 5-week administration of TQ could attenuate nociceptive score in both phases of formalin test in streptozotocin-induced experimental model of diabetes mellitus and has no obvious effect on thermal pain threshold.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



A NEW PROTOCOL FOR SEED GERMINATION OF THE MEDICINAL PLANT, *PROSOPIS FARCTA*

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Syrian mesquite (*Prosopis farcta*) is a medicinal plant that grows in Middle East area [1, 2]. This plant has a hard seed coat impermeable to water that is a factor contributing to poor germination. A research was carried out to study the effect of boiling water and sulfuric acid on seed germination. The experiment was laid out in a completely randomized design with five replications. The seeds were treated with boiling water and acid in different time periods, separately. The results indicated that the boiling water had no effect on seed germination and none of them germinated when treated with boiling water. When all seeds were treated with Sulfuric acid, they were able to germinate in all time periods. The effect of light on seed germination was also studied. After acid wash, the seeds were divided in two groups, one group was kept in darkness and the second one was transferred to light condition (12 h of light and 12 h of darkness). The results showed a significant effect of light on seed germination. Under light condition, the rate of germination increased with increasing the time of treatment with acid, but there is no difference in darkness condition. The results indicate that the light has an inhibition effect on seed germination in this plant.

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INFLUENCE OF DIFFERENT STRAINS OF *AGROBACTERIUM RHIZOGENES* ON HAIRY ROOT INDUCTION IN *NEPETA POGONOSPERMA*

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Agrobacterium rhizogenes carries T-DNA that introduces into the plant genome. This Ri T-DNA alters the phenotype of the transformed roots and the plants that regenerate from them [1]. Hairy root is characterized by a high growth rate and genetic stability. It has been proven to be an efficient means of producing secondary metabolites that are normally biosynthesized in roots of differentiated plants [2]. The genus of *Nepeta* presents 67 species that are found wild in different regions of Iran. Most of them are endemic; one of these endemic plants is *N. pogonosperma*, a member of the mint family (Labiatae) and has medicinal properties [3]. In this study different *A. rhizogenes* were tested to investigate the ability for transformation in *N. pogonosperma*. Five different strains of *A. rhizogenes*, namely *A. rhizogenes* 15834, A4, A13, A7, MSU440 were used for hairy root induction. Stem and leaf were used as explants. Inoculation with *A. rhizogenes* strain MSU440 with stem explants were found to be an effective means of inducing hairy root formation in *N. pogonosperma*.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



INFLUENCE OF INTERACTION BETWEEN NITROGEN FERTILIZER AND ARSENIC ON PLANT GROWTH AND ESSENTIAL OIL YIELD OF TWO BASIL CULTIVARS

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Arsenic (As), ranked 20th in abundance in the earth crust, is a toxic element widely found in the environment and organisms. Arsenic can enter terrestrial and aquatic environments through both natural processes and anthropological activities [1,2]. *Ocimum basilicum* L. (sweet basil) is one of the Lamiaceae family members that has been traditionally grown as marketable crop in Europe, US, and SE Asia. Basil is cultivated for the freshmarket as a culinary herb, as a condiment or spice in the dried/frozen leaf form, and as a source of aromatic essential oils for use in foods, flavours, and fragrances. In addition, fresh herbage is exploited in medicinal treatment. This study was conducted to investigate the influence of nitrogen fertilizer on plant growth and essential oil yield of two basil cultivars. The treatments were N fertilizer included three levels (50, 150, 250 mg/kg soil). Fixed amount of arsenic in arsenic sulphate 15 mg/kg soil was added to all pots. The measured parameters were: quantitative yields (dry and fresh weight of plant, flowering stem length, number of lateral branches, number of leaves, height and leaf per plant) and qualitative yields (content of essential oils and N, P, K in plant tissues). The results showed that two cultivars basil had significant effect on all traits. Interaction fertilizer and arsenic had significant effect on flower stem length, leaf number and the number of lateral branches.

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EFFECT OF MUNICIPAL SOLID WASTE LEACHATE COMPOST ON SEED GERMINATION AND GROWTH IN PLANT HERB ANDREWS (*LOWSONIA INERMIS*) UNDER LABORATORY CONDITIONS

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Composting organic residue is an interesting alternative to recycling waste as the compost obtained may be used as organic fertilizer. The moisture content of urban solid wastes in Iran is very high. A large volume of leachate is produced in the process of converting these wastes into compost. The leachate contains relatively large amounts of organic matter, plant nutrients, soluble salts as well as small amounts of some heavy metals. Leachate levels, including 0, 25, 50, 75 and 100 ml were applied using a completely randomized design with three replications. The studied factors were root length, shoot length, germination percentage and germination rate. The results indicated that the effect of significant leachate compost application on root length, shoot length, germination percentage and germination rate [1,2].

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16, 17 May 2012
Kish Island



ESSENTIAL OIL COMPOSITION OF *NEPETA MAHANENSIS* AND *NEPETA BRACTEATABENTH*.

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The genus *Nepeta*, one of the largest genera of the Lamiaceae family comprises nearly 300 herbaceous perennial, rarely annual species most of which are spread out over the world. One of the greatest diversity and richness of species is found in South western Asia, and especially Turkey and Iran [1]. Iran, particularly, is one of the centers for *Nepeta* (common Persian name is *Pune-sa*) with about 75 species, and approximately 53% of endemics [2]. Several *Nepeta* species are used in folk medicine as diuretic, diaphoretic, antitussive, antispasmodic, anti-asthmatic, febrifuge, emmena-gogue, and sedative agents, and for the antiseptic and astringent properties as topical remedy in children with cutaneous eruptions, and for snake and scorpion bites. Some species are used as medicinal herbs in Iran, for example, *N. ispahanaica*, *N. binaloudensis*, *N. bracteata*, *N. pogonosperma*, and *N. pungens*, while *N. crispa* is used as a culinary herb [3]. *Nepeta mahanensis* is an endemic plant species that was first recorded in 2003 [2]. The aim of this work was to characterize the chemical composition of the essential oils of two native *Nepeta* species of Iran. Dried areal parts of each plant were subjected to hydrodistillation for 2h, using a Clevenger-type apparatus. The obtained essential oils were dissolved in n-pentane, dried over anhydrous sodium sulfate and were stored until analysis. The oils were analysed by GC-MS. Twenty components were identified in the oil of *N. mahanensis* with 1,8-Cineole (43.09%), 1-Acetoxydesert-3-ene (20.47%) and β -Pinene (8.41%) as main constituents. Twenty- six compounds were characterized in the oil of *N. Bracteata Benth.* with D-Limonene (4.76%), (R)-(-)-Pulegone (7.17%), β -Caryophyllene (9.96%), Caryophyllene oxide (12.25%), Bicylogemacrene (13.16%), and Germacrene D (14.74%) as the most abundant components. According to the results of previous study, the isomers of nepetalactones were the main components of *N. mahanensis* [4], however, in this study for the first time it has been shown that 1,8-Cineol and 1-Acetoxydesert-3-ene are the main components of *N. mahanensis* oil. The high amount of 1,8-Cineole in the oil of *N. mahanensis* is remarkable. Potential activities of this essential oil component have been shown against *Helicobacter pylori*, Gram-negative or Gram-positive bacteria and some fungi [1]. Therefore these results support the traditional usage and also possible use of *Nepeta* volatile oils in pharmaceutical industry.

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INVESTIGATION THE SALINITY ON SOME PHYSIOLOGICAL PROPERTIES OF LEMON BALM
(*MELISSA OFFICINALIS* L.).

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Lemon balm (*Melissa officinalis* L.) is a perennial plant that belongs to the family of labiate and it is very important medicinal plant due to its medicinal value and high antioxidant and anticancer compounds, it has a special place between plants. Salinity stress is one of the most important factors limiting plant growth and it influences the yield of plants. This study was conducted to identifying the effects of salinity on Lemon balm in 1390 year in a randomized completely design with five treatments of salinity 0, 2, 4, 6 and 8 dS and three replications, each replication had three pots. This experiment was done in greenhouse conditions in pots containing pit and perlite (1:1 ratio) and the changes in total phenol (spectrophotometry) and antioxidant activity (using DPPH), the length of stem and root, fresh and dry weight of stem and root of lemon balm plant under salinity stress were investigated. The analysis of variance showed the effect of different levels of salinity is significant ($p < 0.01$) and all traits except total phenol and antioxidant activity were decreased with increasing salinity [1,2].

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Kish Island



THE EFFECT OF DIFFERENT AMOUNTS OF AMMONIUM TO NITRATE IN NUTRITIONAL SOLUTIONS ON THE GROWTH OF LEMON BALM (*MELISSA OFFICINALIS*).

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Lemon balm is very important plant due to its application in the pharmaceutical, health and nutritional industry. An effective method to increase the growth and quality is using of suitable nutrition with nitrogen. This study was performed to investigating the effect of nitrate on physiological and morphological properties of lemon balm. In this experiment the effect of four different ratios of ammonium to nitrate in nutritional solutions on lemon balm was studied. This study was performed in a completely randomized design with four treatments and four replications in a greenhouse conditions. Seedlings after planting in pots containing pit and perlite (1:1 ratio) were fertigated once every 48 hours. The analysis of data showed, total yield increases with increasing nitrate levels and antioxidant capacity increases with increasing ammonium which is in the following the antioxidant capacity of the balance- growth (GDB). This means that there is a substitution relationship between plant growth and production of secondary metabolites and in undesirable environmental conditions the growth rate decreases but production of secondary metabolites increase. The analysis of variance showed the amount of total phenol is influenced by the nutritional solution and there was significantly difference ($p < 0.01$) among treatments [1,2].

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APPLICATION OF MICROWAVES IN EXTRACTION OF ALKALOIDS FROM FRESH AND DRIED JUJUBE

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Ziziphus commonly called jujube is a species of *Ziziphus* in the buckthorn family Rhamnaceae, used primarily as a fruiting shade tree. It is a small deciduous tree or shrub reaching a height of 5–10 m. Jujube is both a delicious fruit and an effective herbal remedy. It aids weight gain, improves muscular strength and increases stamina. In Chinese medicine, it is prescribed as a tonic to strengthen liver function. It functions as antidote, diuretic, emollient and expectorant. So this case is suitable for pharmaceutical and phytochemical research. Jujube contains fruit acids, sugars, hydroxycoumarins, triterpenes, peptide alkaloids, isoquinoline alkaloids, flavonoids, tannins, mucilage, and triterpene saponins.

The purpose of this work is the development of a rapid, reliable and reproducible method of extraction of alkaloids from fresh and dried fruits of *ziziphus jujuba* [1-3]. At the First fat removed from powder of fruits by using petroleum ether. This extraction has prepared by maceration in ethanol, and then we experimented the extraction of alkaloids under microwave irradiation at different times and powers in the particular limit, so that we achieve higher efficiency. In this study we evaluated the alkaloids of the fruit of jujube and investigated the effect of microwaves on the alkaloids of extraction. At the end the results has compared [4-6].

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THE INVESTIGATION OF THE EFFECT OF BED TYPES ON ROOTING OF STEM CUTTINGS IN HANA (*LAWSONIA INERMIS* L.)

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Hanna (*Lawsonia inermis* L.) is one of the medicinal plants which has many health benefits due to having Lawsonia. One of the best methods of propagation is cuttings. Since rooting medium is one of the important factors affecting root formation of stem cuttings in plants, in this study the effect of 3 beds sandy soil, loam and clay was investigated. Current study focused on best rooting medium for root formation from stem in november 2011. This experiment was performed with ten replications. Stem cuttings were placed in the beds after wounding the bottom of cuttings. After three months, the parameters of rooting percentage, the number of roots, the average of roots length, the percentage of ash, the root fresh and dry weight were measured. Results showed the highest rooting percentage was observed in the sand bed however, rooting percentage in beds of loam and clay were close to each other. The highest root number, root length, root fresh and dry weights were obtained in loam. The highest percentage of ash was obtained in clay bed, there was no significant difference between in beds of loam and sand [1,2].

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A STUDY ON EFFECT OF *TAMARINDUS INDICA* KERNEL AND *TRIBULUS TERRESTRIS* FRUIT ON PROLIFERATION OF THE HUMAN PROSTATE CANCER CELL *IN VITRO*

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Prostate cancer is the second most common cancer in men with a worldwide incidence of 25.3 per 100,000 [1]. A medicinal herb *Tribulus terrestris* has been used to treat various diseases including hepatocellular carcinoma and *Tamarindus indica* is used traditionally in abdominal pain, diarrhea and dysentery, helminthes infections, wound healing, malaria and fever, constipation, inflammation, gonorrhea, and eye diseases. The aim of the present study was to investigate the anticancer activity of *Tribulus terrestris* fruit (TT) and *Tamarindus indica* kernel (TI) hydroalcoholic extracts in prostate cancer cells [2,3].

Hydroalcoholic extracts prepared with soxhlet. The antitumor activity of TT and TI were surveyed in seven different concentrations and 5-fluorouracil drug on 2 cell line of LNCap-FGC-10 (prostate cancer) and HSkMC (fibroblast) as control. MTT assay was used for toxicity, 5-Bromo-2'-deoxyuridine (BrdU) assay for cell proliferation and TUNEL test was used for measuring apoptotic cell death.

The TT and TI extracts showed cytotoxic activity towards prostate cancer cell line with an IC(50) 350.67 and 4608.80µg/ml, reading optic density (OD) at The highest concentration was 0.09767 and 0.433nm and flow cytometry analysis estimated that the plant extracts induced 74% & 31% apoptosis respectively.

These data indicate that TT and TI extract have cytotoxic, anti-proliferative and pro-apoptotic activities. According to our results, these extracts are less toxic for normal human skin fibroblasts in comparison to cancer line investigated. Further research in this field using animal models would help to explore and interpret the potential properties of TT and TI as an anticancer supplement.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



STUDY OF ANTI-INFLAMMATORY EFFECTS OF *ORIGANUM VULGARE* EXTRACT ON RAT MIXED GLIAL CELL CULTURE

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Medicinal plants are the most important source of life saving drugs for the majority of the world's population. Plant secondary metabolites are economically important as drugs, fragrances, pigments, pesticides. *Origanum Vulgare* L. _ Oregano, is a perennial plant that belongs to the Lamiaceae family. The aroma, flavor and pharmaceutical value of cultivated Oregano is a consequence of its essential oil which consists mostly of monoterpenes and sesquiterpenes [1]. Oregano extract obtained by Soxhlet extractor have been used to test anti-inflammatory effects on rat mixed glial cell. The main compounds present in extract of Oregano were thymol, rosmarinic acid and carvacrol [2]. Rosmarinic acid, an important phenolic compound, is commonly found in species of Lamiaceae. Rosmarinic acid has a number of interesting biological activities, e.g. antiviral, antibacterial, anti-inflammatory and antioxidant. HPLC analysis permitted the identification of thymol as the most anti-inflammatory compounds present in Oregano sample. The primary rat mixed glial cell culture for anti-inflammatory purposes were treated with respective doses of Oregano extraction.

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ANTIMICROBIAL AND ANTIOXIDANT ACTIVITIES OF SOME PLANTS BELONGS TO FAMILY OF LAMIACEAE AND THEIR RELATIONSHIP WITH TOTAL PHENOL CONTENT

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Undoubtedly, medicinal plants are the valuable natural sources which were constantly used in pharmaceutical applications. The seeds of five medicinal plants from the family of Lamiaceae (Seed's purity = 99 %; seed's vigourity 98%), Summer savory (*Satureja hortensis*); Marjoram (*Majorana hortensis*); Salvia (*Salvia officinalis*); Lemon balm (*Melissa officinalis*) and Herb Hyssop (*Hyssopus officinalis*) were obtained and cultured. Consequently, 250 mg of grown plant samples were placed in 10 ml Acetone (80%) and centrifuged (rpm: 5400 min for 10 min), finally, 1 ml of the well extracted samples were used for the tests. A Folin-Ciocalteu test described by Spanos and Wrolstad (1990), was used for analysing total phenol contents and for the determining anti oxidation activity of the tested samples was determined by 2, 2-diphenyl-1-picrylhydrazyl test (DPPH) described by Brand-Williams et al., (1995). Finally a Disk Diffusion Method was used to determine antimicrobial activity of extracts, Tested organisms were selected by fallowing gram negative bacteria: *Escherichia coli*, *Staphylococcus epidermis*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*. Our results indicated that, the highest antioxidant activity among these five medicinal plants was achieved in *Hyssopus officinalis* before flowering by amount of 9.63 mg/ml, even though there wasn't any significant difference before flowering stage and after flowering stage. Considerably, the lowest antioxidant activity was recorded for *Majorana hortensis*. Notably our results also showed that, the highest total phenol content was achieved in *Salvia officinalis* after flowering (47.27 mgGAE/g dry weight) even though there was no significant difference between before and after flowering stages. Amazingly, the lowest content was achieved for *Hyssopus officinalis* the medicinal plant which the antioxidant activity was recorded higher than the others. Considerably, the highest antimicrobial activity was achieved from *Salvia officinalis* against *Escherichia coli*, *Staphylococcus epidermis*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae* microorganisms. In the counterpoint, the lowest antimicrobial activity was achieved from *Melissa officinalis* against *Escherichia coli* [1,2].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF ORGANIC MANURE, BIOLOGICAL AND CHEMICAL FERTILIZERS ON CHLOROPHYLL INDICATORS OF HERB ISABGOL

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One of the physiological causes of poor growth may be impaired in the photosynthetic system of plants. In this regard, and to evaluate the effect of organic manure, biological and chemical fertilizers On chlorophyll fluorescence parameters, chlorophyll and chlorophyll a and b pigments in isabgol, an Experiment in completely randomized design with 6 treatments and 4 was performed in agricultural year of 89 in Zabol University. Fertilizer treatments were: vermy compost (10 tonnes / hectare), manure (20 tonnes / hectare), Biological phosphate fertilized 2 (100 gram/ hectare), bio-fertilizer phosphate 3 (100 grams / hectare), Triple Super Phosphate (50 kilograms / hectare) and control. The results of variance analysis showed that the effect of fertilizers in all parameters was significant on P <0.01. The highest chlorophyll a and b with an average of 1.34 and 0.48 mg / g wet weight, respectively, related to the treatment of animal manure and vermy compost. The highest total chlorophyll content with average 1.82 was from vermy compost treatment. The highest fluorescence yield (0.549), variable fluorescence (212.7), fluorescence maximum (387.37) and the lowest initial fluorescence (174.67) was related to the treatment of animal manure. The highest number of chlorophyll meter (36.60) was from organic manure [1,2].

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CONVENTIONAL VERSUS CRYO-GRINDING OF MEDICINAL PLANTS: ST JOHN'S WORT AND LEMON BALM

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Oxidation and heat in conventional grinders lead to degradation of vitamins, enzymes, volatile components and many other active substances in the plant. While using cryogenic and an inert environment (liquid nitrogen) prevents deterioration of active substances and the produced powder does not suffer any alteration compared with the original plant in quality and quantity. The preservation of the whole active substances of the plant (Totum) enhances the synergic interactions and the drugs prepared with this technique will be more efficient [1-3].

In this research work, using a cryogenic grinding system designed in our lab, qualitative and quantitative comparative studies between cryogenic and conventional grinding systems using St John's Wort (*Hypericum perforatum*) and Lemon Balm (*Melissa officinalis*) have been done. The plants were tested according to the pharmacopeae standard procedures. For the cryogrinding work, some processing parameters such as feeding rate, liquid nitrogen flow, screw conveyor rotation speed, grinder pins speed and plant temperature at the end of the screw conveyor have been set to obtain the optimum conditions.

The results showed a higher quality of the products processed with the cryogrinding system (color, appearance, odor, particle size distribution and active substance amount) depending on the physico-chemical stability of the active substances and the texture of the plant (leaf, root, seed ...).

Plant	Active Substance	Pharmacopeae Range (%)	Active Substance in Grinded Sample (%)	
			Cryogrinding	Conventional
Lemon Balm Aerial Parts	Rosmarinic Acid	Min. 4%	8.55 ± 0.54	9.03 ± 0.14
St John's Wort Flowering Tops	Total Hypericins	Min 0.08%	0.146 ± 0.02	0.127 ± 0.11

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CHROMATOGRAPHIC FINGERPRINTING AS AN EFFECTIVE TOOL FOR ANALYSIS OF TRADITIONAL FORMULATIONS: AN EXAMPLE OF QUINCE OXYMEL

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Global increase in demand for herbal medicine introduces a need to ensure quality of the herbal drugs using modern analytical techniques. Fingerprint analysis approach using chromatography has become the most potent tools for quality control of herbal medicines because of its simplicity and reliability. By definition, a chromatographic fingerprint of an herbal medicine is a chromatographic pattern of pharmacologically active and/or chemically characteristic constituents present in the extract [1]. This pattern is very important for traditional multi-herbal drugs because these kind of drugs act with their whole chemical constituents not with one or two active compounds. Quince oxymel (Jalinus® syrup) is one of these traditional drugs mentioned in Iranian Traditional Medicine as *Sekanjabin-e Safarjali* [2]. The ingredients of the formulation are quince concentrate, ginger vinegar extract, and honey. The overall of constituents makes a temperament (*Mizaj*) for the syrup and this temperament presents therapeutic characteristics. Thus, analysis of whole ingredients is necessary.

To analysis quince oxymel via fingerprinting, nine samples of different batches of Jalinus® syrup (Barij Essence Pharmaceutical Company) were sampled, diluted with methanol (1:4), and loaded equally on silica gel 60F₂₅₄ along with quince concentrate, ginger vinegar extract, and honey. Then, TLC was run with mobile phase of CH₃Cl/ CH₃OH/ petroleum ether (3:2:1) to separate components. To investigate fingerprint profile, spots were detected under UV 254 and 366 nm. For more clarification, derivatization with Anisaldehyde, H₂SO₄, Vanillin, and Natural Product was done. The result shows that all samples are similar in 7 spots with the R_f of 0.02, 0.05, 0.36, 0.39, 0.63, 0.75, and 0.9.

Because therapeutic effects of quince oxymel are related to whole constituents of drug, fingerprint profile of this medicine along with physicochemical items should be considered as standards. Presence of 7 spots with R_f mentioned above are necessary.

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THE AROMATHERAPY EFFECT OF ROSEMARY AND LAVANDER ON PRIMARY DYSMENORRHEA: A CLINICAL CONTROLLED TRIAL

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Primary dysmenorrhea (PD) is seen in more than 95% of women of childbearing years. PD causes absence from school and workplace and has annually resulted in 600 million work-hours of absenteeism and two billion dollars of financial loss in America. Considering the known side-effects of chemical drugs in the management of primary dysmenorrhea, and the use of aromatherapy effect of rosemary and lavender in traditional medicine practices as an energizing, tranquilizing and anti-spasmodic medicinal herb, this study was done to determine the aromatherapy effect of rosemary and lavender extract on the reduction of pain and other systemic symptoms accompanying PD in female students at Azad university, Falavarjan branch in.

A randomized, double-blind, placebo-controlled pilot trial among 120 female students aged 18 to 27 who suffered from primary dysmenorrhea was undertaken. The participants were randomly divided into four groups: rosemary, lavender, both of rosemary and lavender, and placebo. The rosemary, lavender, both of rosemary and lavender groups was affected on extract by aromatherapy oil Burners during 15 minutes ,twice a day for three days, starting from the onset of bleeding or pain. Participants were followed for two to three cycles from the beginning of menstruation through the three days of bleeding. Main outcome measures were the severity and duration of pain at 2 and 3 months. A visual analogue scale was used to record pain.

There were statistically significant reductions in pain scores and pain duration scores in the groups that took rosemary (P <0.001) and both of rosemary and lavender (P <0.01) and lavender (P <0.01). The decrease in pain score was reflected by a significant reduction in other drug use among the treatment groups compared with the women in the placebo group. The magnitude of the reduction was significantly greater in the rosemary group than in the lavender or both of rosemary and lavender, and placebo groups. Each three group effectively relieved menstrual pain as compared with the placebo. More clinical trials are needed to establish the efficacy of these herbal drugs [1-4].

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16, 17 May 2012
Kish Island



THE EFFECT OF HESPERETIN, AN ACTIVE FLAVONOID OF CITRUS PEEL, ON SOME MARKERS OF OXIDATIVE STRESS IN BRAIN TISSUE OF DIABETIC RATS

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Chronic diabetes mellitus accompanies enhanced oxidative stress burden and decreased activity of antioxidant defense system. Due to significant role of enhanced oxidative stress in development of some neurological disorders and with regard to antidiabetic and antioxidant effect of hesperetin, this study was conducted to evaluate the effect of its administration on brain tissue level of some markers of oxidative stress in diabetic rats.

In this experimental study, male Wistar rats (n=32) were divided into 4 groups, i.e. control, hesperetin-treated control (10 mg/kg), diabetic, and hesperetin-treated diabetic groups (10 mg/kg). Hesperetin was administered i.p. from seventh days after diabetogenic agent streptozotocin for 3 weeks. Tissue level of malondialdehyde and nitrite and activity of superoxide dismutase (SOD) in brain tissue were measured at the end of the study.

Diabetic rats showed a significant increase in tissue level of malondialdehyde (p<0.01) and nitrite (p<0.05) and a non-significant reduction of SOD activity and hesperetin treatment significantly reduced only level of MDA (p<0.05) and SOD activity in treated-diabetic groups was non-significantly higher as compared to diabetics.

Chronic treatment with hesperetin could attenuate some markers of oxidative stress in brain tissue from diabetic rats and this could possibly prevent some neurological disorders due to enhanced oxidative stress.

ANTIOXIDANT AND ANTIMICROBIAL PROPERTIES OF *THYMUS VULGARIS* FROM DIFFERENT ZONES OF CHAHARMAHAL AND BAKHTIARI

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Thymus vulgaris is a valuable medicinal plant that possesses antispasmodic, antiseptic, expectorant, calm inative, antitussive and antioxidative properties [1,2]. The main constituents of thyme include Thymol, Carvacrol and flavonoids often through to have anti bacterial, antiflatulent and anti- worm properties [3]. In this research infusions were prepared in common way in which teas are prepared for human consumption. The total phenolic content was measured by folin-ciocalteau assay and total antioxidant potential capacity was estimated by FRAP assay. The plant samples were filter sterilized and used for disc diffusion and broth microdilution technique for antimicrobial assay. Plants extracts showed FRAP 87.45 $\mu\text{mol/l}$ and total phenolic concentration 85.1. The antimicrobial activity of extract was tested on three strains of gram positive bacteria (*Staphylococcus aureus*, *S. epidermis*, and *Bacillus subtilis*), three strains of gram negative bacteria (*E. coli*, *Salmonella typhimurium*, and *Pseudomonas aeruginosa*), and two strains of fungi (*Candida albicans*, and *Aspergillus*). The thyme extract inhibited the growth of the tested microorganisms. The results indicate that this plant has good potential for use as an antimicrobial and antioxidant agent. Plants from different geographic zones and climates and soils showed some difference on antimicrobial and antioxidative properties.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF ASCORBIC ACID AND BASIL OIL ON INHIBITION OF SEED DELETERIOUS OF *CARTHAMUS TINCTORIUS* L., AND *BORAGO OFFICINALIS* L IN UNFAVORABLE STORAGE ENVIRONMENT

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Carthamus tinctorius L. and *Borago officinalis* L. are two important medicinal plants that have fatty oil containing seeds. Oil content of the Borago seed is 30-40% by weight of which 23-24% is Gamma Linolenic acid. It is a fatty acid that the body converts to a hormone-like substance called prostaglandin E1. As a medicine, Gamma Linolenic acid is commonly used as nutritional supplement and prescription pharmaceutical to combat heart diseases, diabetes, atopic eczema, arthritis, multiple sclerosis and cyclical mastalgia [1, 2]. Safflower (*Carthamus tinctorius* L.) is an important oilseed crop that its oil contains the unsaturated fatty acids linoleic acid and oleic acid and the saturated fatty acids stearic acid and palmitic acid. Oleic acid has good frying characteristics, namely, stability and a bland flavor, while linoleic acid reduces the cholesterol level in the blood [3, 4]. On the other hand, economically, seed deterioration in unfavorable storage environment is a major problem in agriculture. Therefore in this research the effect of accelerated aging treatment on borago and safflower seeds was investigated. Seeds were treated with 98.2% relative humidity for two weeks. This treatment reduced the oil content, germinability and rate of seed germination. The aged seeds produced some abnormal upon germination. Root length and shoot length of seedlings were reduced proportionately. Pretreatment of seeds with ascorbic acid for 10 hours before accelerated aging treatment or treatment of seeds with basil oil vapour for two weeks under accelerated aging conditions substantially alleviated all of deleterious effects of aging. Our results suggest that unfavorable storage environment reduced germinability and oil content of these plants and ascorbic acid and basil oil can increase storage potential of borago and safflower seeds in unfavorable environment.

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COMPARATIVE STUDY OF BIOLOGICAL ACTIVITY OF METHANOL EXTRACTS FROM ROOTS AND STEMS OF *RHEUM RIBES* L.

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Although *Rheum ribes* L. is a food plant which has many local uses as vegetable, there are a few reports from Iran, referring to its biological activities especially evaluating of its toxicity, in spite of its uses as food in the literature. The most popular standard method is the brine shrimp assay using the larvae of *Artemia salina*.

This study concerns on *in-vitro* anti-microbial potentials and cytotoxicity of methanol extracts from roots and stems of *Rheum ribes* L. Disc Diffusion Assay and Micro-well dilution methods are used for this purpose. Eleven Microorganism was used including 3 gram-positive and 5 Gram -negative bacteria and 3 fungi. Results confirm that activity of roots is significantly more than that of stems (specially) on gram-positive bacteria. Examination of cytotoxic activity of this plant exhibits that methanol and water extract of *Rheum ribes* L. don't have any cytotoxic activity and mentioned species is a safe plant as far as we consider shrimp larvae [1, 2].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF INFUSION TIME ON CONTENTS OF TOTAL PHENOLIC COMPOUNDS RELEASED FROM *LIPPIA CITRIODORA* AND *HIBISCUS SABDARIFFA*

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Nowadays, the consumption of some infusions made from the plants *Lippia citriodora* and *Hibiscus sabdariffa* in our country have been increased. These infusions have showed that because of the presence of some phenolic and coumarinic compounds in their constitutions could reduce the incidences of some cancers and also improved some cardiac diseases [1, 2]. Since the infusion time can be important determinant for absorption of polyphenols from these plants; therefore this study was aimed to determine in which time of infusions, the phenolic compounds can be increased.

After the plants collected, they were measured for their dry weight. Then a 5/100 concentration (w/v) was made for each of plants and serially diluted. The diluted samples were analysed for total phenol amounts using Folin- Ciocalteu reagent and based on Singleton and Rossi`s method [3]. Finally, the total phenol amount was obtained based on Gallic acid for each gram of dry weight in different infusion times which were included from 3 to 40 minutes.

The most amount of total phenol obtained from *L.citriodora* and *H.sabdariffa`* infusion had been in times of 30 and 18 min., which were equalled to 21.42 and 16.18 mg GAE / g of dry weight, respectively Based on this study, we can conclude that the presence of oxidizable phenol groups in two above mentioned times are greater than the other infusion times and considering them may affect the diseases risk.

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ANTINOCICEPTIVE AND DOSE-DEPENDENT EFFECT OF CURCUMIN, AN EFFECTIVE CONSTITUENT OF TUMERIC, IN DIABETIC RATS AND EVALUATION OF THE INVOLVEMENT OF LIPID PEROXIDATION

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With regard to antidiabetic and antioxidant effect of curcumin and its beneficial effect on inflammation, this study was designed to investigate its antinociceptive effect in streptozotocin-diabetic rats using formalin test and hot tail immersion tests.

In this experimental study, male Wistar rats were divided into 6 groups, i.e. control, curcumin-treated control (50 mg/kg), diabetic, sodium salicylate (SS)-treated diabetic, and curcumin-treated diabetic groups (10 and 50 mg/kg). Curcumin was administered 7 days after streptozotocin injection for 5 weeks.

High-dose curcumin treatment of diabetic rats reduced pain score in both acute and chronic phases of the formalin test ($p < 0.05$). Meanwhile, SS administration significantly reduced pain score only at chronic phase of the test ($p < 0.05$). Regarding hot tail immersion test, diabetic rats showed a significant reduction in tail flick latency as compared to control ones ($p < 0.01$) and high-dose curcumin treatment of diabetic rats significantly increased this latency relative to diabetics ($p < 0.05$). Diabetic rats also showed a significant increase in tissue level of malondialdehyde (MDA) ($p < 0.01$) and high-dose curcumin significantly reduced level of MDA in diabetic group ($p < 0.05$).

Taken together, chronic administration of curcumin could attenuate nociceptive score in acute and chronic phases of formalin test in streptozotocin-induced experimental model of diabetes mellitus and increase thermal pain threshold and part of its beneficial effect is through attenuation of lipid peroxidation in periphery.



**National Congress on Medicinal Plants
16, 17 May 2012
Kish Island**



EFFECTS OF SUCKERS REMOVING AND PLANT DENSITY ON BARBERRIES YIELD

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This experiment was carried out in Berjand Agricultural research station during 1998-2004 to study the effect of suckers removing and plant density on fruit yield of *Berberis vulgaris*. The experiment was performed as factorial design base on randomized complete blocks, with three replications. Factors were tree density as factor A: (2x3, 2x4, 3x4 and 4x5) and suckers removing as factor B: (1 trunk, 3 trunks, 5 trunks and Control). According to the obtained results, Suckers removing and plant density had important effects on yield. The treatment plant density 2x3m and 5 trunks for each plant had the highest yield. The lowest PH 2.89 was related to (a1b4), and effects of Suckers removing and plant density on acidity was not significant. The treatment with 5 trunks on each plant had the lowest rate of infection to *Syrista Parreyssi* [1, 2].

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DOSE-DEPENDENT EFFECT OF CURCUMIN ON SERUM LEVEL OF ASPARTATE AND ALANINE AMOINOTRANSFERASE AND CARDIAC LEVEL OF OXIDATIVE STRESS MARKERS IN DIABETIC RATS

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Diabetes mellitus in long term accompanies enhanced oxidative stress burden and decreased activity of antioxidant defense system. Due to antidiabetic and antioxidant activity of effective constituent of turmeric, curcumin, its effect on serum level of aspartate and alanine aminotranferase and cardiac level of some oxidative stress markers was determined.

In this experimental study, rats were divided into 5 groups, i.e. control, curcumin-treated control (50 mg/kg), diabetic, and curcumin-treated diabetic groups (10 and 50 mg/kg). Curcumin was administered 7 days after streptozotocin injection for 5 weeks. Serum level of aspartate and alanine aminotranferase and heart tissue level of malondialdehyde (MDA) and nitrite and activity of SOD were measured.

Diabetic rats showed a significant increase in serum level of aspartate and alanine aminotranferase ($p < 0.05-0.01$) and high-dose curcumin significantly reduced serum level of these enzymes ($p < 0.05$). In addition, diabetes was followed by increased level of MDA and nitrite in heart tissue ($p < 0.05-0.01$) and non-significant decrease of SOD activity and high-dose curcumin treatment significantly reduced MDA and nitrite level ($p < 0.05$) and did not significantly change activity of SOD.

Chronic treatment with curcumin could dose-dependently improve serum level of alanine and aspartate aminotranferase and some oxidative stress markers in cardiac tissue of diabetic rats.



ANTIOXIDANT PROPERTIES OF PHENOLIC EXTRACT OF TWO SPECIES OF *CRATAEGUS* FRUIT (INCLUDING THE FLESH AND THE SEEDS)

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A variety of medicinal and pharmaceutical properties of many *Crataegus* plant species (family Rosaceae) have long been recognized, among which Hawthorn is well known as a traditional plant, capable of reducing free radicals and therefore used as a heart tonic medicine. The main compounds responsible for its bioactive properties are believed to be the phenolic compounds. In this study, phenolics and antioxidant properties of *C. pontica* (yellow color berries), and *C. meyeri* (red color berries) collected from W. Azerbaijan area of Iran have been investigated. Flesh and seed extracts of both species were individually obtained by means of methanol solvent, as it has been proved that alcoholic extracts show significantly higher amounts of phenolic compounds as compared to that of water extracts.

The methanolic extracts of the two *Crataegus Spp.* were studied by their total flavonoid and [1] phenolic [2] contents, the scavenging effect on DPPH (2,2-diphenyl-1-picrylhydrazyl) radicals [3], and nitrite [4] radicals. The results were as follows:

The highest flavonoid content was observed in *C. meyeri* fruit flesh (1.56gr Catechin/100gr F.W.), and in *C. pontica* seeds (1.22gr/100gr F.W.) The highest phenolic content was observed in *C. meyeri* fruit flesh (1470.7mg Gallic Acid/F.W.) and in *C. pontica* seeds (1127.25mg Gallic Acid/F.W.). The scavenging effect on DPPH observed for *C. pontica* seeds and *C. meyeri* seeds were almost equal (about 95%), and *C. meyeri* flesh showed a higher percentage than that of *C. pontica*. The percent scavenging effect on nitrite radicals for *C. pontica* fruit flesh was higher than that of *C. meyeri* fruit flesh and *C. meyeri* seeds higher than *C. pontica* seeds.

It can be concluded that all the studied factors of *C. meyeri* and *C. pontica* flesh and the seeds have shown inverse results. The higher the flesh value in each species, the lower the seeds value and vice versa.

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THE EFFECT OF CURCUMIN, AN EFFECTIVE CONSTITUENT OF TUMERIC, ON SHORT-TERM SPATIAL MEMORY AND PASSIVE AVOIDANCE LEARNING AND MEMORY IN DIABETIC RATS AND EVALUATION OF THE ROLE OF LIPID PEROXIDATION

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With regard to antidiabetic and antioxidant effect of curcumin and its beneficial effect on memory, in this study the effect of its chronic administration on learning and memory of diabetic rats were investigated.

In this experimental study, Wistar rats were divided into 5 groups, i.e. control, curcumin-treated control (50 mg/kg), diabetic, and curcumin-treated diabetic groups (10 and 50 mg/kg). Curcumin was administered 7 days after streptozotocin injection for 5 weeks. For evaluation of learning and memory, passive avoidance and Y-maze tests were used. Level of malondialdehyde in hippocampal homogenate was also measured.

STL significantly decreased in diabetic ($p < 0.01$) and low-dose curcumin-treated diabetic ($p < 0.05$) groups and this parameter was significantly higher in diabetic group receiving high-dose curcumin as compared to diabetics ($p < 0.05$). Meanwhile, alternation percentage was significantly lower in diabetic group relative to control ($p < 0.05$) and high-dose-treated diabetic group showed a significant increase in comparison with diabetic group ($p < 0.05$). Diabetic rats also showed a significant increase in tissue level of malondialdehyde ($p < 0.05$) and high-dose curcumin significantly reduced level of MDA in diabetic group ($p < 0.05$).

Chronic treatment with curcumin at a high dose could enhance the capability of consolidation and recall in diabetic animals and could improve short-term spatial memory in diabetic animals and part of its beneficial effect is via attenuation of lipid peroxidation in hippocampus.



A NOVEL METHOD OF ENHANCED WOUND HEALING: A SURVEY ON BED SORE OF SPINAL CORD INJURED PATIENTS IN QAZVIN PROVINCE, 1389

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Bed sore has a strong impact on the mental, socioeconomic status and the quality of life of sedentary people. The high cost of health care lists it in the most important medical issues. The healthcare methods should be low cost and as easy as possible.

There were 50 men and women with spinal cord injury in this clinical trial, registration code *IRCT138905114490N1*, which aged between 30-55 years old. They were randomly selected and divided in to intervention and control groups. Inclusion criteria were having bed sores and exclusion criteria included having underlying disease and chronic skin disorder. These two groups got identical. After collecting informed consent forms from participants in the research and notifying them, the degree of bed sore determined by a standard, 13-item measuring tool named PSST (pressure sore status tool). Routine care of bed sore don in control group. Pure *Aloe vera* gel dressing was used in trial group 2 times a day for 1 month. The obtained scores were compared and analyzed by computer software SPSS18 and t-test with confidence of 0.95.

There were 50% and 52% men in trial and control groups, respectively. The average age of participants was 35.72±11.44. The average period of generation spinal cord injury was about 2 years and %46 of wounds appeared in last year. The rate of wound healing was 15.12 in intervention group and 8.69 in control group. Results showed the intervention affections on wound healing in patients ($P = 0.0001$) and rate of wound healing in the group received *Aloe vera* was more quick. There wasn't any significant relation between age, sex and wound healing ($p = 0.856$).

The usage of *Aloe vera* gel on bed sore lead to success and speed healing. Thus, we can list it as an effective treatment in standard treatment protocols for bed sore.

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EFFECTS OF ETHEPHON ON TERPENOIDS IN *CANNABIS SATIVA L.* AT VEGETATIVE AND SEXUAL STAGES

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Plants synthesize an astonishing diversity of isoprenoids, some of which play essential roles in photosynthesis, respiration, and the regulation of growth and development. In the present study we investigated the effect of ethephon on changes in the amount of many terpenoid compounds including, tetrahydrocannabinol (THC), cannabidiol (CBD), chlorophyll, carotenoids, α -tocopherol and pyrovate in *Cannabis sativa* at tow stages of development vegetative and productive. Also changes in stem fibers were studied in vegetative stage. Treatment with 1 and 100 μ M ethephon increased THC content up to 9 fold in vegetative stage. In the productive stage ethephon had more effect on increasing of THC content and in this subject treated leaf of femal plants with ethephon had more THC in comparison with those of male plants. Femal flowers had the most THC content, but femal flower showed a little sensitivity to ethephon. Any concentration of ethephon did not increase THC content in femal plants and 1 μ M ethephon caused a significantly decrease in THC content. Treatment with 10 μ M ethephon increased CBD content in vegetative stage and femal plant leaf but decreased in leaf and flower of male plants and female flowers. The amount of CBD in male and femal leaf and femal flowers increased under 5 and 100 μ M ethephon. In the vegetative stage these treatments decreased CBD content. The amount of α -tocopherol declined under ethephon treatment at vegetative stage, but the leaf of male and femal plants shown an increased in the tocopherol content. The levels of chlorophyll and carotenoids raised in treated plants with 1 μ M ethephon at vegetative and productive stages. The results of our experiment showed that treatment with 1 μ M ethephon can improve fibre quality on the stem of cannabis. With regard to the fact that ethephon treatment had not negative effect on the surface of leaf and chlorophyll conten this treatment can be a suitable treatment for increasing of THC, α -tocopherol and fibre in *Cannabis sativa* [1-5].

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16, 17 May 2012
Kish Island



EVALUATION OF ANTIFUNGAL EFFECTS OF ETHYL ACETATE EXTRACT OF *ORIGANUM MAJORANA* L. AGAINST THREE STRAINS OF FUNGI

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Fungi due to their characteristics can be an agent to cause diseases. Many diseases are responsible to increase susceptibility of body to many infections which has been seen in diseases such as loss or deficiency in human immune system (AIDS) or organ transplantation and neoplastic diseases [1]. Furthermore, fungal spoilage is one of the major problems of food industry [2]. Today, researchers are interested in using plant substances as antifungals. Marjoram (*Origanum majorana* L.) because of a wide range of flavonoid compounds [3], propose to be a good candidate for this purpose. Therefore, in this study, antifungal activity of marjoram extract was evaluated against *Alternaria* spp, *Aspergillus* spp and *Penicillium* spp isolated from environment samples. Powdery form of leave and flowers of marjoram was purchased from Barij Esans Institute. Then, extraction of them was achieved by using soxhlet method as well petroleum ether, diethyl ether and methanol 80% in three stages. After acid hydrolysis, extract was separated in two phases of ethyl acetate and water. The minimum inhibitory concentration (MIC) and the minimum fungicidal concentration (MFC) were assayed according to CLSI protocol. Results showed that ethyl acetate extract has a good ability to inhibit fungal growth. MIC and MFC of total flavonoids was 0.202 µg/ml for *Penicillium* spp and *Aspergillus* spp, although MIC and MFC for *Alternari* spp was two fold (0.404 µg/ml). Further investigation should be carried out to assay antifungal activity *in vivo* experiments. It can be concluded that extract of marjoram had excellent antifungal activity against three used fungal strains and can be used as a new chemical to remove or control this kind of fungal infections.

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EFFECT OF PLANTING DATE, WEED CONTROL TIME AND METHOD ON WEED POPULATION AND YIELD OF CUMIN (*CUMINUM SYMINUM* L.)

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In order to evaluation the effect of planting date, method and date of weed control on weed population and cumin yield an experimental was conducted in the experimental research field, Faculty of Agriculture, Shirvan University, during 2010. Treatments included planting date (30 December, 20 January and 30 February), weeding date (first true leaf, start of branching and beginning of flowering stages) and weed control methods (hand weeding, fire treatment and control). The results showed that there were significant differences between different sowing date, as the highest yield was in 30 December and the lowest was in 30 February. It showed that there were significant differences between hand weeding, control and fire treatments. The highest and lowest yield of cumin seed was obtained in hand weeding and control methods respectively. There were no significant differences in start of branching stage, beginning of flowering stages and first true leaf stage in different times of weed control but the highest cumin seed obtained in start of branching. There were significant differences in number of weeds between different sowing dates. The highest number of weeds was obtained in 11 December. Also, the lowest number of weeds was obtained in 20 January. There were significant differences in height of weeds between different sowing dates. The highest and lowest height of weeds was obtained in 11 December and 29 February respectively. Total numbers of weed species were 13 from 10 different plant families. Number of dicotyledons species (12) were more than monocotyledons (1) [1, 2].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



STUDY ON THE CHANGES OF PHENOLIC COMPOUNDS METABOLISM AND PROTEIN PATTERN DURING SOMATIC EMBRYOGENESIS IN *RUMEX TUBEROSUS* L. SUBSP. *HORIZONTALIS*

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The family polygonaceae consists of 30 genera and 600 species that 100 of them belong to the genus *Rumex*, which is distributed in Alborz and Zagros heights in Iran. The species of *R. tuberosus* L. by having high level of phenolic content, and antioxidant and antiallergic activities has received more attention in medicine and food industry. Somatic embryos and adventitious buds (shoots) from different explants were induced on MS medium supplemented with several combination of 2, 4-D and Kin, 6% (w/v) sucrose and 1 g/l charcoal. Somatic embryos germinated and developed into plantlets, after transferring to MS medium PGRs free. In this investigation, in order to understand embryos maturation process, changes in protein during somatic embryogenesis were studied by spectrophotometric and SDS-PAGE methods. Results showed that synthesis of protein increased during embryo maturation. Also the presence of 11, 26, 32, and 43 kD proteins in the heart-shaped embryos and more developed ones were distinguished. The synthesis and deposition of those storage and LEA proteins during somatic and zygotic embryogenesis are usually regulated. Through ABA and water stress induced gene expression. Polyphenol oxidase and peroxidase activities were studied spectrophotometrically during somatic embryo development. Results showed that the activities of these enzymes increased during somatic embryo development. In addition, total phenols were determined in calli and regenerated plantlets during somatic embryogenesis. Results showed total phenolic content increased by adding of auxin concentration in the medium and during early somatic embryogenesis induction, these compounds decreased [1,2].

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THE EFFECTS OF TWO TYPE'S SYNTHETIC AUXIN AND MEDIUM ON ROOTING OF DAMASK ROSE CUTTINGS

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To assess the effects of various concentrations of indole butyric acid, naphthalene acetic acid and different culture medium on rooting hardwood damask rose cuttings, the experiment was conducted in 1390-1389 at the Agriculture Faculty of Saveh. Required cuttings existed in station of Agriculture Faculty of Kermanshah were prepared. This study was conducted by factorial experiments in completely randomized block design with three factors including factor levels in the culture medium (sand, perlite and vermiculite) and hormonal factors at two levels of IBA (3000, 0) ppm and NAA hormonal factors at two levels (3000, 0) ppm. In this study, each treatment has three replicates and six cuttings in each repeat length of 16 cm and a diameter equal to the damask rose, and pests and diseases will be used. In this experiment, the bottom of the cuttings was dissolved in 5 seconds. Results showed that the highest percentage of rooting belonged to treatments IBA with three thousand concentrations and the best factor of medium is sand [1-10].

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INTERCROPPING SESAME (*SESAMUM INDICUM* L.) WITH FLAX (*LINUM USITATISSIMUM* L.) AND THEIR EFFECTS ON YIELD AND YIELD COMPONENTS

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Trend to produce aromatic and medicinal plants and requirement for these natural productions is increasing in all over the world [1]. In many of countries, cultivation of sesame and flax play hardly any role in cash products, therefore cultivating these plants as cash crops require to encourage farmers by changes in agricultural operations. For example Intercropping can be an alternative way for monoculture and is a possible way to increase the yield and harvest index of medicinal plants. In order to evaluate the effects of yield and yield components in row intercropping of sesame (*Sesamum indicum* L.) and flax (*Linum usitatissimum* L.), a field experiment was conducted during 2009-2010 and 2010-2011 at the Agricultural Research Station of Ferdowsi University of Mashhad, Iran. For this purpose a randomized complete block design with three replications and six treatments was used. The treatments included one row of sesame + one row of flax (1:1), two rows of sesame + two rows of flax (2:2), three rows of sesame + three rows of flax (3:3) and four rows of sesame + four rows of flax (4:4) and their monocultures. Results showed that economic yield of sesame, and number of seeds per plant was affected by different treatments and there was no significant difference in 1000-seeds weight and harvest index in sesame. Number of nodes, seeds and branches per plant, and economic yield in flax also affected by different treatments but there was no significant difference in 1000-seeds weight and harvest index of flax. Dry matter accumulation in triple-row intercropping for sesame were highest, while for flax, monoculture showed the highest dry matter. The same results were observed in other studies [2, 3].

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RESPONSE OF *THYMUS DAENENCIS* L. TO DIFFERENT RATES OF CHEMICAL FERTILIZERS

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In this research, the effect of different rates of chemical fertilizers (N.P.K) was studied on *Thymus daenencis* morphological features, flowering shoot yield, essential oils yield and percentage, in different harvests. The research was conducted in 2008-2009, at the Research Institute of Forests and Rangelands. Experimental design was split plot in time in the form of a randomized complete block design with three replications. The main factor was chemical fertilizer ($N_0P_0K_0$, $N_{40}P_{32}K_{40}$, $N_{80}P_{64}K_{80}$, $N_{160}P_{96}K_{120}$, $N_{160}P_{128}K_{160}$ kg/ha) and the sub factor was different harvest times. Results indicated that the main factor (fertilizers) and the sub factor (harvest time) significantly affected plant height, flowering shoot yield, essential oil percent and essential oil yield. The interaction of main factor \times sub factor had also a significant effect on plant height and flowering shoot yield ($P \leq 0.01$). Mean comparison of the main factor (fertilizer) in the first year indicated that the highest flowering shoot yield was achieved in $N_{160}P_{128}K_{160}$ (1499.8 kg/ha). The highest essential oil percent was achieved in $N_{160}P_{128}K_{160}$ (20.78 kg/ha). Mean comparison of the main factor (fertilizer) in the second year represented that the highest flowering shoot yield was obtained in $N_{160}P_{128}K_{160}$ (1523.33 kg/ha). The highest essential oil percent (1.27%) and yield (18.23 kg/ha) were obtained in $N_{160}P_{96}K_{120}$. Mean comparison of the sub factor (harvest time) in the first year showed that the first harvest time had the highest flowering shoot yield (1232.509 kg/ha), essential oil percent (1.19%) and essential oil yield (14.68 kg/ha). In the second year, the first harvest time had the highest flowering shoot yield (1358.08 kg/ha), essential oil percent (1.33%) and essential oil yield (18.16 kg/ha). The overall results of this experiment indicated that the first harvest time was better than the second harvest time in both years of the experiment.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE STUDY OF ANTI-INFLAMMATORY EFFECTS OF *MIGRI-HEAL*[®] ON MIX-GLIAL CELLS

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Migri-Heal[®] is a herbal medicine therapeutic drug for migraine headaches. This Iranian drug has a formulation that derived from traditional medicine and modern medicine and pharmacy. This Iranian drug has been registered by number 1228143083-IRC at the Ministry of Health and Medical Education. However, the effects of *Migri-Heal*[®] on the immune functions of glial cells in the central nervous system (CNS) have not been well characterized. Because nitric oxide (NO) and the proinflammatory cytokine tumor necrosis factor- α (TNF- α) produced by glial cells are involved in various physiopathological conditions in the CNS, this study examined the effects of *Migri-Heal*[®] on the production of NO and TNF- α from mouse glial cells treated with lipopolysaccharide (LPS). LPS induced a concentration-dependent increase in the production of NO and TNF- α from the rat primary mixed glia cultures. With ultralow concentration of *Migri-Heal*[®] significantly inhibited the LPS-induced production of NO and TNF- α . Since the theoretical mechanism of action of nitric oxide in migraine headaches based on the increase of nitric oxide (NO) in the patients. This phenomenon in laboratory research on endothelial cells has been proven which decrease. We refer to this theory as anti-inflammatory effects in this medicine on glial cells in paid.

The last good dosage of the drug a for anti-inflammatory effects on glial cells have been obtained [1-4].

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EFFECT OF DROUGHT STRESS ON KERMAN POPULATION ANISUM (*PIMPINELLA ANISUM L.*)

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Anisum (*Pimpinella anisum L.*) is one of the aromatic herbal plants which have great export value (Delazar *et al.*, 2006). Because of the importance of water stress influence on plant growth, metabolism and yield, Anisum was imposed to water stress treatments. In order to investigate effect of drought stress on Kerman Population Anisum an experiment was conducted in Alborz Karaj stations in 2011. Experiment was conducted using randomized complete block design with 4 replications. Treatment included 90, 70, 50 and 30 %FC. Effect of drought stress were significant difference on plant height, small canopy, big canopy, number of umbels, root yield, stem yield, leaf yield and total dry matter or biomass ($\alpha=0.001$). Effect of drought stress on were not significant difference on lateral stem and long root. Comparison of treatment means showed that highest and lowest plant height (50.25 cm) and (36.25 cm), small canopy (32.50 cm) and (20.50 cm), big canopy (50.39 cm) and (24.75 cm), number of umbels (92.25 n/p) and (28.25 n/p), root yield (120.334 kg/ha) and (75.5 kg/ha), stem yield (712 kg/ha) and (175.834 kg/ha), leaf yield (267.668 kg/ha) and (91.667 kg/ha) and total dry matter or biomass (1100 kg/ha) and (310 kg/ha) belong to 90% FC and 30% FC respectively.

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16, 17 May 2012
Kish Island



DELIBRATION TOXICITY OF *MIGRI-HEAL*[®] ON MIX GLIAL CELLS

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Migri-Heal[®] is a herbal medicine therapeutic drug for migraine headaches. This Iranian drug has a formulation that derived from traditional medicine and modern medicine and pharmacy. This Iranian drug has been registered by number 1228143083-IRC at the Ministry of Health and Medical Education. However, the effects of *Migri-Heal*[®] on the immune functions of glial cells in the central nervous system (CNS) have not been well characterized. Considering that anti-inflammatory effects of this drug have been proven, According to this result, we examined the toxicity of this drug on mix glia cells and to get Limiting doses of the drug on mix glia cells. To obtain the limiting doses MTT test was used [1-4].

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NEGATIVE PERFORMANCE OF ROOT EXTRACT OF
ONOSMA DICHROANTHUM BOISS. ON THE BURN WOUND HEALING IN AN ANIMAL MODEL

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Onosma dichroanthum Boiss. belongs to Boraginaceae family with locally known as " Hava Chobeh", is one of the most important Mountainous medicinal plants in north of Iran, Its red roots have been used by the rural healers as either singular or combination with other plants as antiseptic and anti-inflammatory to treat the burns wound healing. In this study, the acetonic extract of plant root was used for the evaluation of its healing efficiency on burn wound model in rat. Burn induced in Wistar rats, and subsequently they were divided into five groups were treated as follow: Group-I ointment containing of extract 2%, Group-II, traditional ointment containing of goat lipid and root extract, Groups-III ointment alone, Group-IV (positive control) the standard drug (silver sulphadiazine) and Group-V (negative control) untreated rats. The assessment the burn area healing was carried out within 14 days [1, 2]. Our results showed that the treated group in I and II, the intensity of wound increased up to the day 8, even the wound diameter much more expanded than negative control group (group V). The best result was demonstrated by silver sulphadiazine treated group (group IV). This study shows that *Onosma dichroanthum* Boiss. roots did not have any effect on healing of burn wounds in an animal model. Therefore results are opposite with the general believe in North of Iran's population. Further studies are requiring for assessment of this plant in combination with other plants on burn wound healing.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECTS OF AVOCADO SOYBEAN ON THE HYDROXYPROLINE AND GLYCOSAMINOGLYCANS IN EXPERIMENTAL CUTANEOUS WOUND HEALING IN RAT

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Wound healing is a dynamic and complex sequence of events of which the major one is the synthesis of the extracellular matrix components. The early stage of wound healing is characterized by the laying down of a provisional matrix, which is then followed by formation of granulation tissue and synthesis of collagen and elastin by the fibroblasts. The provisional matrix or the ground substance consists of glycosaminoglycans (GAGs) and proteoglycans (PGs), which are protein-GAG conjugates. The beneficial effects of avocado and soybean unsaponifiables (ASU) are known as antiarthritic agents. Influence of avocado soybean unsaponifiables on the content of GAGs and hydroxyproline in the granulation tissue of healing wounds have been investigated in the present study.

Forty five rats were divided into three equal untreated (I), treated with cream base (II) and treated with ASU ointment (III). Fifteen rats, five from each group, were euthanized on each interval of 10, 20 and 30 days post-injury respectively and the required samples were collected for biochemical analysis.

Significant increase in galactoseamine content on day 10, 20 and 30 post-injury and glucoseamine and hydroxyproline content on day 10 post-injury in the treated group was seen. The most significant increase of glucoseamine and hydroxyproline was seen on day 20 and 30 post-injury in the treated group.

These findings suggest the potential role of avocado and soybean unsaponifiables in increase level of GAGs and hydroxyproline during the maturation phase of cutaneous wound healing.

EFFECT OF SILYMARIN OINTMENT IN GENE EXPRESSION OF STROMELYSIN 1 (MMP-SECRETED BY RAT FIBROBLASTS IN EXPERIMENTALLY INDUCED CUTANEOUS WOUND HEALING

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Silymarin, a flavonolignan extracted from the seeds of 'milk thistle' (*Silybum marianum*), has been widely used from ancient times because of its excellent hepatoprotective action.

Stromelysin-1 is one of the proteolytic factors of early wound contraction and it is of crucial importance in organizing cell cascade network that are responsible in healing. This study was undertaken to evaluate the effect of silymarin (*Silybum marianum*) on gene expression of stromelysin 1 (MMP-3) during cutaneous wound healing in rat model.

Silymarin was obtained from the Sigma Company and was mixed in two concentrations of 6 mg and 12 mg in 1 ml of cream base. Sixty rats were randomly divided in to four equal groups of control, cream base, low concentration and high concentration silymarin. The animals of the treated groups received low and high concentration of silymarin ointment. The animals of the third group received cream based ointment in the same way and the animals of the fourth group received no treatment regime. Twenty rats, 5 in each group, were sacrificed on each interval of 10, 20 and 30 days post-injury respectively and the required samples were collected for molecular analysis. MMP-3 was detected and quantified by real time PCR analyses. The treated animals with low dose of silymarin showed no significant increase in MMP-3 in days 10 and 20 post-injury but this gene was significantly expressed on day 30 post-injury. There were no significant differences between the high doses of silymarin on day 10, 20 post-injury with that of the low dose on day 30.

The most significant increase in MMP-3 was seen in the treated group with high dose of silymarin on day 30 post-injury.

These findings suggest the potential role of silymarin in gene expression of MMP-3 during the maturation phase of cutaneous wound healing.



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16, 17 May 2012
Kish Island



**ALOE VERA IMPROVED THE STRUCTURAL AND FUNCTIONAL PROPERTIES OF THE
EXPERIMENTAL CUTANEOUS WOUND HEALING IN RAT**

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Effects of *Aloe vera*, a tropical cactus, on healing of full-thickness cutaneous wounds in rats were studied. Full size mature leaves were cut from the plant and the rind was removed. The colorless parenchyma was ground in a blender and centrifuged at 10,000×g to remove the fibers. The supernatant was lyophilized and stored at room temperature.

Sixty mature female rats were randomly divided into three, control, cream base and treatment groups. Full-thickness excision incision wounds were created on the back of each rat. The resulting powder was mixed with cream and 1 mg of it was topically applied on the wounds of the treated group. The control group receive only cream base and the untreated group receive nothing. After euthanasia of five of the animals of each group on day 10, 20 and 30 post-injury, the wounds granulation tissues were collected for hydroxyproline analysis as an index of collagen content and for morphometric and morphological studies. The biomechanical studies were undertaken on the lesions of 5 animals of each group and normal skin of 5 intact animals on day 30 post-injury.

Except for cellularity and macrophage number that were significantly higher in the treated lesions other parameters including collagen content, morphological and morphometrical criteria were not significant on day 10 post-injury.

The collagen content and density, and tissue alignment in the treated animals showed a significant improvement compared to those of the untreated and cream based treated animals on day 20 post-injury. The most significant changes was evident in the treated lesions with *Aloe vera* on day 30 post-injury and the collagen content, maturity of fibroblasts, regulation of cell distribution and tissue alignment, ultimate strength, yield strength and maximum stress of their lesions showed a significant improvement to those of the untreated and cream-base treated animals.

Application of aqueous extract of *Aloe vera* on cutaneous open wounds in rat restored the structural and mechanical properties of the injured skin. Further biochemical and molecular studies are needed to elucidate other aspects of the mechanism of action of this therapeutic regime on the structural and functional performance of cutaneous injuries.

CONTROL OF ASPERGILLUS FLAVUS BY NATURAL PRODUCTS

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Postharvest diseases are the most important factors that lead to decrease in quality and export of fruits and subsequently high number of losses of products. Pistachio product as a commercial output has a special importance in the agricultural production of some countries especially in Iran. Aflatoxins are toxic and carcinogenic metabolites produced by species of *Aspergillus*, but *A. flavus* is more dangerous than others. Aflatoxin contamination of pistachio nut is undoubtedly a serious problem for Iran and other producing countries. The application of chemical fungicides may lead to the development of fungicide-resistant strains of postharvest pathogens. In addition, public concern over the presence of chemical residues in foods has resulted in cancellation of some of the most effective fungicides. The aim of the present study is to determine the inhibitory effect of Carvacrol on the growth of *A. flavus*. This fungus was isolated from infected pistachio in CRIOF, Bologna University in Italy. Five level of Carvacrol (concentrations of 12.3, 36.91, 73.82, 147.64 and 295.28 $\mu\text{l l}^{-1}$ (1, 3, 6, 12 and 24 μl per plate)) were tested *in vitro* in vapour phase. Results showed that there were significant differences among used concentrations. The best growth inhibition result was at concentrations 12 and 24 μl per plate [1].

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Kish Island



INVESTIGATION OF ZINC TOXICITY ON SOME PHYSIOLOGICAL AND BIOCHEMICAL PROCESSES IN *ZEA MAYS L.*

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Heavy metals in growth media can function as stresses, causing physiological constraints that decrease plant vigor and inhibit plant growth [1]. Although zinc (Zn) is an essential micronutrient for normal growth and development of plants, it becomes phytotoxic and inhibits cell growth in plants at excessive concentrations [2]. In this study, the effect of zinc toxicity was studied in maize plant grown in a growth chamber. Experimental plants were treated with different concentrations of zinc sulfate (0, 400 and 600 μ M). After 12 days of growth, the plants were harvested and the shoots and roots were analyzed for assay plant growth and biochemical parameters. Our results showed that the shoot and root growth, pigment content (chlorophyll a, b and total carotenoids) were decreased by increasing Zn concentration while malondialdehydes as indicator lipid peroxidation and H₂O₂ concentration were increased in these conditions. So we concluded that zinc toxicity caused serious physiological damages in maize plant.

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EFFECT OF DIFFERENT MULCH MATERIALS AND OPTIMAL CHEMICAL, ORGANIC AND BIOLOGICAL FERTILIZER MANAGEMENT ON ECOLOGICAL AGRICULTURE CHARACTERISTICS IN COMMON PURSLANE (*PORTULACA OLERACEA L.*)

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In order to effect of different mulch materials and optimal chemical, organic and biological fertilizer management on ecological agriculture characteristics in common purslane (*Portulaca Oleracea L.*) In Khuzestan conditions, a field experiment was conducted Experimental field of Ramin Agriculture and Natural Resources University in Ahwaz, south-western of Iran, during 2010- 2011 growing season. Treatments were arranged as a factorial experiment in a randomized complete block design with three replications. Fertilizer treatments at five system (chemical fertility system, chemical fertility system+ biofertilizers, chicken manure , chicken manure + biofertilizers and cow manure + biofertilizers) and three mulch materials (without mulch, wheat straw, black plastic). The result indicated that application organic manure and biofertilizer the steam dry weight, leaf dry weight, plant height, number of leaves and chlorophyll content was increased, but at cow manure + biofertilizers, number of weed and weed weight had the highest amount. The superiority of organic manure may be attributed to balanced and gradual release of plant nutrients and increased water holding capacity to support growth [1]. The black plastic was the highest steam dry weight, leaf dry weight, plant height, number of leaves and chlorophyll content and lowest number of weed and weed weight. This case showed probability of application of mulch and organic manures and biofertilizers with chemical manure in integrated management of common purslane.

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**EFFECT OF ENVIRONMENTAL FACTORS ON SEED GERMINATION IN SAFFLOWER
(*CARTHAMUS TINCTORIUS* L.)**

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Safflower (*Carthamus tinctorius* L.) is an annual plant from Astraceae family that is currently grown on large scale in Iran and many other countries for its edible oil as well as for medicinal purpose. To study the effect of environmental factors on seed germination in safflower, this experiment was conducted in the National Plant Gene Bank, Seed and Plant Improvement Research Institute, Karaj, Iran, in 2011. Ten treatments repeated four times were used in this study. Experimental treatments included; light, darkness, dry freeze, wet freeze, dry fridge, wet fridge, dry oven, wet oven, high temperature, and control. Results showed that the germination rate was highest under control condition followed by the darkness, light, dry freeze, wet freeze, wet fridge, dry fridge, and dry oven, respectively. In wet oven treatment seed were rotten and did not germinate. Seedling length (root and shoot) decreased in all treatments in following order: light, darkness, wet fridge, dry freeze, dry fridge, wet freeze, control and dry oven. However, total fresh weight of seedlings decreased in the following order: darkness, wet fridge, light, dry freeze, dry fridge, control, wet freeze and dry oven. Increases in total dry weight of seedlings followed different order: dry fridge, dry oven, wet freeze, light, control, darkness, wet fridge, and dry freeze. In conclusion, the highest rate of seed germination was observed in dark treatment and highest seedlings dry weight which implies seed vigor was obtained from dry freeze treatment [1-7].

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**INVESTIGATION THE EFFECTS OF PRIMING ON (*FOENICULUM VIULGARE* MILL.) SEED
YIELD AND YIELD COMPONENTS UNDER WATER STRESS CONDUCTION**

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Water Stress is one of the most important inhibitors in crops and drug crops seed germination seedling growth and maturity seed priming seems to overcome the inhibition and increases environmental stress resistance [1, 2] .

In order to investigate the effects of priming on Fennel seed yield and seed yield components; an experiment was conducted as a randomized complete block design, in split plot, with 4 replications in 1389-90.

Irrigation was in 2 levels (water stress , no water stress) in mainplots; and different priming materials in 4 levels (distilled water , NaCl in -1 Mpascal osmotic potential ; KCl in -1.5 Mpascal and salicylic acid with 0.5mM concentration).The result showed that the effects of water stress and priming on umbels plant umbelets perumbel , seed yield , biological yield was significant ; but the effect on plant height (at Flowering stage) and harvest index was not significant . One thousand seed weight was effected by interaction effects of water stress priming .Salicylic acid treatment (0.5 mM) seemed to be the best priming treatment for decreasing negative effects of water stress for Fennel; but its cultivation is not suggested in the areas with high water stress.

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Kish Island



THE EFFECTS OF SALICYLIC ACID AND OSMOPRIMING ON FENNEL (*FOENICULUM VIULGARE* MILL.) SEED GERMINATION

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Seed priming is one of the popular and efficient techniques for seed germination [1, 2]. In order to investigate the effects of different priming methods on Fennel seed germination speed, seedling root and shoot length; an experiment was conducted a randomized complete block design (Factorial), in 3 replications. Fennel seeds treated with salicylic acid in 4 levels (0, 0.1, 0.5, 1 mM); KCl in 4 levels (0, -1, -1.5, -2 M pascal); NaCl in 4 levels (0, -1, -1.5, -2 M pascal); for 24 hours in 20 °C temperature. All priming treatments increased germination speed and seedling shoots and root length, significantly. KCl in -1 M pascal had highest germ. Speed and seedling shoot and root length. In NaCl treatment -1.5 Mpascal showed highest germ. Speed, seedling shoot and root length. In salicylic acid treatment, 0.5 mM concentrations showed highest above indexes.

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EVALUATION EFFECT OF DIFFERENT MULCH MATERIAL ON YIELD AND TECHNOLOGICAL PROPERTIES OF FOUR IRANIAN GARLIC POPULATION (*ALLIUM SATIVUM*. L)

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In order to study the effect of mulching on four Iranian garlic populations (*Allium sativum* .L) an experiment was conducted as a factorial experiment in completely blocks design with three replication in the growing season of 2011 at the medicinal plant farm of the Ramin Agriculture and Natural Resources University. Experimental factors included; mulching system (M) in four levels (wheat straw, cow dung, black polyethylene and control) along with garlic population (P) in four levels (Dezful, Ramhormoz, Baghmalek and Hamedan). Plant height, leaf number per plant, stem diameter, plant weight, shoot dry matter, bulb and cloves characters include of (weight, length and diameter) and cloves number per bulb were evaluated [1]. Results showed that mulching system had significant effect ($p \leq 0.5\%$) on leaf number per plant, stem diameter, plant weight, shoot dry matter and cloves length but no significant effect on plant height and significant effect ($p \leq 0.1\%$) on other parameters. Garlic population had significant effect ($p \leq 0.1\%$) on the all these parameters. The highest and lowest bulb yield were obtained in black polyethylene mulch with Hamedan population (40 ton.ha⁻¹), and no mulching with Baghmalek (9 ton.ha⁻¹) respectively. Consequently cow dung mulch can be recommended for sustainable production for medicinal plants such as garlic in this region.

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EFFECT OF OSMOPRIMING AND BIOPRIMING ON INDICATORS OF GERMINATION OF CUMIN (*CUMINUM CYMINUM* L.)

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Priming is a way to increase the percentage and the rate of seed germination rate before plantin [1]. To evaluate the effect of sodium chloride (NaCl), *Azospirillum* and *Pseudomonas41* strain on indicators of germination cumin a factorial experiment in completely randomized with three replications was conducted at the Research Laboratory, Faculty of Agriculture, University of Birjand in 2011. Experimental treatments consisted of two level of -1 and -2 MPa osmotic potential made of NaCl and three level of using bacteria *Azospirillum*, *Pseudomonas41* and their combination.

There was significant different in Germination percentage between treatment of bacteria and control, which was 90% for control and zero for bacteria. Germination percentage of -1 and -2 MPa reduced 89% and 90% respectively compared to control, and the different between osmotic potential of -1 and -2 MPa was not significant in germination percentage. The seeds did not germinated in Bacteria and combination of bacterial and osmopriming. Germination rate in all treatments was not significant.

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EFFECT OF PLANTING DATE, ORGANIC AND NITROGEN MANURES ON YEILD AND EFFECTIVE MATTER OF ARTICHOKE (*CYNARA SCOLYMUS L.*)

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To study the effect of planting date, organic and nitrogen manures on yield and chlorogenic acid of Artichoke, an experiment was conducted as split split plot design, at Kashan region in 2011. To be precise, planting date (26 October, 2, 9 November) arranged to the main plot, organic manure (0 and 14 ton/ha) as the sub plot and nitrogen manure (0, 125 and 250 kg/ha) as the sub sub plot. Consequently, the results indicated that planting date, organic and nitrogen manures had no significant effect upon plant height, plant fresh weight, plant dry matter, leaf area and chlorogenic acid percent. However, planting date × organic manure had a significant effect over leaf area, and maximum leaf area – 2381.3 cm² – was obtained during planting date of 2 November with 14 ton/ha of organic manure. Also, the maximum plant fresh weight and plant dry matter was obtained during the second planting date (2 November) with 14 ton/ha of organic manure within 125 kg/ha nitrogen manure. Of course, planting date × organic manure had a significant effect over chlorogenic acid percentage. The maximum chlorogenic acid percentage (0.42 %) was obtained during the second planting date within 14 ton/ha of organic manure and the minimum chlorogenic acid percentage (0.26 %) was obtained during the first planting date within 14 ton/ha organic manure. To be short, the result indicated that there was a decrease in chlorogenic acid percentage due to the increase of nitrogen manure, and there was the possibility of organic manure application in order to improve chlorogenic acid.

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EFFECT OF GAMMA RADIATION ON DORMANCY AND SEED GERMINATION AND GROWTH OF CORN POPPY (*PAPAVER RHOEAS*).

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Corn poppy is annual or over winter plant and native of Middle East and growing in road sides and waste land in most parts of Iran. It prefers light, friable and sandy soil. Corn poppy flowers 3-12 cm in diameter, bornes on long unbranched axillary peduncles. Corn Poppy is normally insect pollinated, honey and humble bees being the main pollinators.

Common poppy also produces the large number of seed per capsule. The average seed per capsule is given 1300. Seed ripens and shed 3-4 weeks after flowering. *Papaver rhoeas* (diploid, $2n = 14$) contains rhoadine (0.027%) and coptisine (0.004%) as the dominant [alkaloids](#), the latter being the yellow principle of the latex.

Seeds of Corn poppy (Papaveraceae) are dormant at maturity and dormancy is not easily broken, neither sulphuric acid nor mechanical scarification broke dormancy, indicating that seeds were not prevented from germinating by water impermeable seed coat. Seed of this species have underdeveloped embryo and thus morphological dormancy i.e. the embryo has to grow to some critical length before radical emergence. Seeds with only morphological dormancy usually germinate within 30-45 day.

The purpose of the study was to break dormancy and enhancing germination and growth of Corn poppy seed by applying Gamma radiation. Seeds removed from matured capsules collected from wild and treated with different doses of gamma radiation. The experiment was designed in RBD in three replications. Treated seeds sown under controlled condition with proper temperature. Observations were recorded for the time taken for germination, percentage of germination and the mode of the seedling growth.

The result showed that the seed treated at 10 gray (GY) gamma radiation was significantly effected the dormancy break of the seeds. Although the growth of the seedling was not significantly affected. Seed germination percentage was higher as compared to control.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



INFLUENCE OF SOXHLET AND PERCOLATION TECHNIQUES ON ANTIMICROBIAL ACTIVITY OF EXTRACTS OF A NEW ENDEMIC PLANT FROM JUGLANDACEA FAMILY

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Various parameters play roles in extraction of bioactive materials from plants. Extraction method is one of the most important of them [1]. In order to evaluate influence of type of extraction method on performance of plant extracts, two extraction methods of soxhlet and percolation were employed using methanol as solvent. Evaluation was carried out using disc diffusion via evaluation of zone and minimum inhibitory concentration (MIC) [2]. The best results were obtained from soxhlet-extract, for gram-negative bacteria. These findings show that despite heating in soxhlet method during extracting process it has no desirable effect on the quality based on anti-bacterial as well as anti-fungal activities.

In conclusion it must be considered that although soxhlet was originally designed to extract lipids from solid materials [3], it can be very useful method in extracting from plants. However, comparative study is necessary to achieve the best quality, based on desirable properties.

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THE SALICYLIC ACID EFFECT ON THE *SALVIA OFFICIANLIS L.* SUGAR AND PROLINE CONTENTS UNDER DROUGHT STRESS

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Drought stress is a limiting factor in various stages of growth. This study, was conducted in terms of stress with three replications of treatment at 4 levels of drought (control, 1/4, 1/2, 3/4 field capacity), and with 4 levels of salicylic acid concentrations (0, 1, 2 and 4 mM) in the form of factorial experiment in a complete randomized design (CRD) in greenhouse conditions. Then biochemical parameters (reducing sugar amount and proline) were studied and measured in *Salvia officianlis L.* Results showed that increasing in proline and sugars in plants due to the osmotic gradient, caused resistance to loss of water of leaves and leaf contents and accelerated plant growth during stress conditions.

THE SALICYLIC ACID EFFECT ON THE *SALVIA OFFICIANLIS L.* ON SOME OF BIOCHEMICAL PARAMETERS UNDER DROUGHT STRESS

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Drought stress is a limiting factor in various stages of growth. This study, was conducted in terms of stress with three replications of treatment at 4 levels of drought (control, 1/4, 1/2, 3/4 field capacity), and with 4 levels of salicylic acid concentrations (0, 1, 2 and 4 mM) in the form of factorial experiment in a complete randomized design (CRD) in greenhouse conditions. Then biochemical parameters (including the amount of chlorophyll a, and chlorophyll b, total chlorophyll and carotenoids) were studied and measured in *Salvia officianlis L.* Results showed that reduction in the rate of photosynthetic pigments demonstrated that impairment of photosynthetic apparatus is caused by drought stress and free radicals.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



STUDY OF THE ALLELOPATHIC EFFECTS OF *CROCUS SATIVUS* CORMS WATER EXTRACT ON *TRACHYSPERMUM CAPTICUM* L. SEED GERMINATION INDICES WITH MULTIVARIATE STATISTICAL METHODS

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The aim of this experiment is to investigate the prohibitive or stimulative effects of saffron corms water extract on germination indices of *Trachyspermum capticum* L. seeds in order to find the possibility of using this medical plant in mixed cropping with saffron. This is only possible if there are no allelopathic interactions between these plants. This experiment was performed in completely randomized design with four replications and was conducted in Seed Science and Technology laboratory in Faculty of Agricultural of Islamic Azad University – Mashhad Branch in 2011. Treatments were five levels of *Crocus sativus* L. corms water extract concentration (0, 25, 50, 75 and 100%). In this experiment, some indices related to the seed vigour including mean time germination (MTG), mean daily germination (MDG), daily germination speed (DGS), coefficient velocity germination (CVG), seedling vigour indices (SVI) and radicle and plumule length were measured. Analysis of variance showed that effects of treatments on all indices were significant in $\alpha=5\%$, except in MTG. There was a significant positive correlation between all indices studied except for MTG And DGS with all other indices. Also Principal component analysis (PCA) used to describe the relationship between indices in this experiment. Probit analysis was used for studying the seed reaction to different levels of saffron corms water extract concentration.

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LAND SUITABILITY ASSESSMENT FOR CUMIN PRODUCTION USING A GIS-BASE PLAN (A CASE STUDY FOR NORTH KHORASAN PROVINCE)

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In order to assess the land suitability of agricultural lands of North Khorasan Province for cumin production a GIS_Based plan was applied. For this purpose, Digital elevation model (DEM) was provided from 1/25000 digital maps and surface analysis functions were used to create slope, aspect and elevation layers. Also, multiplicative models were provided, tested and used to create rainfall, average temperature and extreme temperatures layers for cumin growing season (from January to June). Cell statistics functions were used to overlay climatic layers to create final layers. Ecological requirements of cumin were provided from CUMMOD model (the simple model for cumin potential yield) data and were used in overlaying functions. In this plan, the lands with slope > 15 %, rainfall > 160 mm, west and north aspects, $t_{avg} < 3C^{\circ}$ and $> 30C^{\circ}$ were considered as unfavorable lands. To obtain final Boolean layer for land suitability assessment of cumin production, spatial analyst functions were used. Our results indicated that just 11.3 % (57194.14 ha) of total agricultural lands of North Khorasan Province are suitable for cumin production. These areas are located in the east side of north Khorasan Province toward the west of Golestan province. Rainfall was detected as the most important determinant factor which affects the fields infection to fungal diseases. Extreme temperatures also were mapped. Our results indicated that pre- February sowing dates are not advised, because the probability maps of extreme temperature occurrence showed these regions are high risk and vulnerable. These results were checked with CUMMOD too. The maps that have provided in this study are suitable for decision making on extending the areas of cumin cultivation as a valuable medicine plant. In this study both irrigated and dry lands were considered. Our results revealed that GIS_based plans can help us to create a shortcut for conscious decision making in large scales, which is a necessity for new crops, especially medicinal plants such as cumin.

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National Congress on Medicinal Plants
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Kish Island



STUDYING THE ANTIBACTERIAL EFFECT OF AQUA AND ALCOHOL EXTRACTS OF *SAMBUCUS NIGRA* AGAINST *E. COLI* (STCC 8739) AND *STAPHYLOCOCCUS AUREUS* (ATCC 6538) BACTERIA

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According to WHO report, creation and incidence of resistant strains against antibiotics in many countries increasingly is in progress. Many attempts conducted to finding new anti microbes from different sources as micro organisms, animals and plants. Elderberry is a medicinal plant with different physiological activities. In this research after gathering and pharmacological and botanical investigations, alcohol and aqua extracts of different parts from Elderberry medicinal plant obtained by mastication and percolation method. The aqua extract provided by sterile water and alcohol extract provided by DMSO in different dilutions in a sequential numbers (1/2, 1/4, 1/8, 1/16 1/32, 1/64, 1/128, 1/256). The antibacterial effects of this plant were investigated by Mueller Hinton Agar (MHA) as a culture media and disc diffusion method. Determining the amounts of MIC (minimum inhibitory concentration) and NBC (minimum bactericidal concentration) was done by macro dilution method against *staphylococcus aureus* (ACCT 6538) and *Escherichia coli* (ATCC 8739). Results showed that alcohol extract of elderberry roots have the most effect on *E. Coli* and the aqua extract of its leaf has the most effect on *S. Aureus* bacteria. This can be due to different structure in cells of negative and positive gram bacteria and due to affecting mechanism from different kind of extracts and its concentration from different parts of plant [1, 2].

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INVESTIGATING THE ANTIBACTERIAL EFFECT OF ALCOHOL AND AQUA EXTRACTS OF *URTICA DIOICA* L.ON GROWING OF *LISTERIA MONOCYTOGENES* (ATCC 7699), *KELLEBSIELLA PNUMONAE* (ATCC 1053)

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The *Urtica dioica* d. plant has therapeutic properties in acute diseases in human. Nowadays the medicinal plants worth and lacking consequents as chemical medicines attracted in world. In present research after gathering and doing pharmacological and botanical investigations, the aqua and alcohol extracts obtained from different parts of Stinging Nettle (*Urtica dioica* L.) by mastication and percolation methods. The antibacterial effects of this plant investigated by disc diffusion method and with three replicate for each test. The mean diameter of ungering circle on culture media of Agar measured and recorded, and then the antibacterial properties of extracts were compared by together. Determining the amounts of MIC (minimum inhibitory concentration) and MBC (minimum bactericidal concentration) was done by macro dilution method against *Listeria monocytogenes* (ATCC 7699) and *Kellebsiella pneumonae* (ATCC 1053). The obtained results showed that aqua extract of different parts of plant have greater antibacterial effects in compare to alcohol extracts of this plant. The aqua extract of root and aqua extract of leaf has the most antibacterial effects on *K. pneumone* and *L. monocytogenes* bacterial, respectively [1, 2].

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EFFECT OF DIFFERENT LEVELS OF ADDED TURMERIC (*CURCUMA LONGA*) & OREGANO (*ORIGANUM VULGARE*) ON THE PERFORMANCE AND BLOOD PARAMETERS OF BROILER CHICKS

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This experiment was conducted to determine the effect of turmeric (*Curcuma longa*) and oregano (*Origanum vulgare*) on performance and some biochemical parameters of broilers. Based on a randomized completely design, 405 day old Ross broilers were distributed into 27 floor pens and reared for 56 days. A basal diet was formulated according to NRC recommendation for starter (0-21 days), grower (22-42 days) and finisher (43-56 days) periods and was supplemented with (0.25 % and 0.5%) turmeric and (0.25 % and 0.5%) *origanum*, resulting in 9 dietary treatments were prepared including control group. Each dietary treatment was fed ad-libitum to 3 replicate groups. The diet containing the highest turmeric and *origanum* dosage had a significantly higher body weight gain and blood HDL and lower mortality, FCR (week 6 & 8), feed intake, blood glucose, triglyceride and cholesterol ($p < 0.05$). No significant differences were detected in carcass percentage between birds fed experimental diets. The highest performance was recorded for birds fed diets supplemented with 0.5% turmeric and 0.5% *origanum* ($p < 0.05$) at the growing and finisher period.

The results of organoleptic test (duo-trio test) revealed that the higher levels of turmeric and *origanum* increased smell and flavor of produced meat.

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COMPARE OF PHENOLIC AND FLAVONOID CONTENTS OF DIFFERENT PARTS OF *CYNANCHUM ACUTUM* L. FROM SEMNAN PROVINCE

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There is an increasing interest in the population in the consumption of natural functional foods since it can result in benefits for human health. *Cynanchum* is a genus of about 300 species including some swallowworts, belonging to the family Apocynaceae (sub-family Asclepiadoideae). *Cynanchum acutum* L. is a perennial weed and a commonly used species in folk medicine [1]. There is a report about the antidiabetic and antioxidant activities of flavonoids of *C. acutum* [2]. The methanolic extract of *C. acutum* decreased the ulcer index and was as effective as reference drug, Ranitidine [3]. The ethanolic extract of leaves and stems of the plant showed significant antibacterial and antifungal activities [4]. Bioactive compounds, are some phenolic and flavonoid substances, can be present in different parts of plants.

Total phenolic contents of aerial part, flower, leaf, stem and root extracts were determined spectrophotometric. The main goal of this study was to compare the yield of phenolic [5] and flavonoid [6] contents in the aqueous and ethanol extracts of each part of *C. acutum*. Amounts of total phenolics of leaves, aerial parts and flower were higher when for extraction water was used compare to ethanol. In contrary, the amounts of flavonoids of stem flower and aerial parts were higher when for extraction ethanol was used compare to water.

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CHEMICAL COMPOSITION OF THE ESSENTIAL OILS OF *NEPETA FISSA* C.A.MEY NORTH WEST OF TEHRAN

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The genus *Nepeta* (Lamiaceae) contains more than 280 spp, which are spread out over most of central and southern Europe, the Near East and central and southern Asia. Remarkably, about 67 species are found wild over Iran, with the common Persian name, "pune-sa" one of the widely distributed species is *Nepeta fissa* C.A. May. In this study, the aerial parts were collected from Imamzadeh Daveud in Tehran province at full flowering stage on June 2011. A voucher specimen has been deposited in the Iran herbarium (IRAN). Air dried aerial parts of the plants (200g) were subjected to hydrodistillation to produce essential oils in 0/32 (w/w) yield. 41 compounds were identified in the essential oils of *Nepeta fissa*, representing (96/5% of the oil of which the major components were found to be α -Gurjurenene (14/21%), n-octyle acetate (11/15%), β -Elemene (10/11%), Hexylisovalerate (8/50%), δ -Elemene (6/55%), α -Amorphene (5/49%), δ -Selinene (4/22%), also Nonoterpene (30/28%), Oxygenated sesquiterpene Hydrocarbon (52/23%) and Oxygenated sesquiterpenes (10/1%) are identified.

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COMPOSITION OF ESSENTIAL OILS FROM CELLS SUSPENSION CULTURES OF *BUNIMUM PERSICUM* BOISS. BY SUPERCRITICAL FLUID, SOLVENT AND HYDRODISTILLATION METHODS

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Bunium persicum is one of the important medicinal and aromatic plants in Iran that belongs to the Apiaceae family. Seeds of this plant contain valuable components including essential oil. In this research the cells from cell suspension cultures and seed of Black zira were extracted by supercritical fluid (SCF), hydrodistillation and solvent methods and analyses by GC. The germinated seeds were the explants for induction of callus on MS medium supplemented with 2 mg/l 2,4-D and 0.5 mg/l kin (A), 2 mg/l NAA and 0.5 mg/l BA (B) and followed by cell suspension cultures establishment. Results of cell suspension cultures showed that the cells on B medium have growth rate higher than A. It was also found that no essential oil was obtained from hydrodistillation of cells, while SCF and solvent methods were successful in essential oil extraction from cells. According to GC analysis, cuminaldehyde as one of the Black zira essential constituents is not detected in the SCF cell and seed samples, while it was present in solvent extracts of both cell and seed samples. Cuminaldehyde concentration in cell and seed solvent extractions was 4.65% and 18.61% respectively [1- 6].

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PHYTOCHEMICAL AND ANTIOXIDANT ACTIVITY IN DIFFERENT PARTS OF *CAPPARIS SPINOSA* RECH. F. IN NORTH OF IRAN

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Capparis spinosa Rech. F. (Capparidaceae) with locally known as "Gole kavar" is one of the most important medicinal plant in many parts of Iran especially in Northern provinces, which has been used in traditional medicine as anti inflammation, antiseptic, liver tonic, diuretic, expectorant and analgesic to treat of emmenagogae, anemia, liver dysfunction, rheumatism, in digestion and antihaemorrhoidal [1,2]. In this research due to study of the relationship between the most important secondary metabolites content (phenol, flavonoid) and their antioxidant activity different parts of plant were collected from KhoshYeylagh Mountain of Semnan province in July 2011, the samples were dried and extracted by methanol. Total phenolic (Tp) and total flavonoids (Tf) content were determined spectrophotometrically and their antioxidant activity were measured by 1,1-diphenyl-2-picryl hydrazyl radical scavenging (DPPH) method and findings indicated that the (Tp) contents had range 9.31 ± 2.09 to 82.86 ± 11.34 mgGAEg⁻¹ and (Tf) contents were between 3.5 ± 1.3 to 86.24 ± 9.2 mgQuEg⁻¹. Antioxidant activity (IC₅₀) was measured in ranges 209.42 ± 6.9 to 845.83 ± 206.56 mg/ml. Analyses of these results showed that there was a positive correlation between antioxidant activity and secondary metabolites content. On the other hand flower buds extract with the highest content of Tp and Tf compounds have better antioxidant activity to compare other parts. Our obtained which could confirmed the traditional use of the flower buds to treatment of many current disorder in therefore we offer to another research about investigation effect of various solvent in release of secondary metabolites in different parts of this plant and survey of their medicinal effects in *in-vivo* and clinical models.

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PHYTOCHEMICAL AND ANTIOXIDANT ACTIVITY IN DIFFERENT PARTS OF *HERACLEUM GORGANICUM* RECH.F. IN NORTH OF IRAN

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Myrtus communis Rech. F. (Myrtaceae) with locally known as "Mure " is one of the most important steppic medicinal shrub in north of Iran, which has been used as anti-inflammatory, anti-allergic, anti-thrombotic, anti-mutagenic, anti-septic, anti-allergenic, antimutagenic, antibacterial, antioxidant, antifungal and anti-aphtus [1,2]. In this research due to study of the relationship between the most important secondary metabolites content (phenol, flavonoid) and their antioxidant activity of plant, different parts were collected from Maraveh Tappeh region in different growth period (May-October 2011). The samples were dried and extracted by methanol. Total phenolic (Tp) and total flavonoids (Tf) content were determined spectrophotometrically and their antioxidant activity were measured by 1,1-diphenyl-2-picryl hydrazyl radical scavenging (DPPH) method. These findings indicated that the Tp contents had range from 9.51 ± 1.5 to 13.74 ± 0.7 mgGAEg⁻¹ and Tf contents were between 4.15 ± 0.5 to 119.15 ± 8.5 mgQuEg⁻¹. Antioxidant activity (IC₅₀) was measured in ranges 175.39 ± 15.9 to 263.74 ± 252 mg/ml. Analyses of these results showed that there was a positive correlation between antioxidant activity and secondary metabolites content and the leaves extract with the highest content of Tp and Tf compounds have better antioxidant to compare another parts. Our obtained which could confirm the traditional uses of this plant to treatments of many current disorders. We offer to another research about investigation effect of various solvent in release of secondary metabolites in different parts of this plant and survey of their medicinal effects in *in-vivo* and clinical models.

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EFFECTIVENESS ANALYSIS OF A MEDICINAL PLANT GROUP ON SIGNIFICANT PHYSIOLOGICAL FACTORS OF THE ENDURANCE ATHLETE (KAYAKER)

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Herbs have been used throughout history to enhance physical performance but scientific scrutiny with controlled clinical trials has only recently been used to study such effects. The following herbs are currently used to enhance physical performance despite the lack of scientific evidence of effect: Chinese, Korean, and American ginseng; Siberian ginseng, Mahuang Chinese Ephedra; Ashwagandha; Rhodiola; Yohimbe; *Cordyceps* fungus, Shilajit or Mummio; Smilax; wild Oats; Muira Puama; Tribulus Terrestris; saw palmetto berries; β - Sitosterol and other related sterols; and wild yams (Antonio et al. 2000., Bedir and Khan 2000, Brown et al. 2001). According, the main objective of this study project was Survey the selection of medicinal plants on some of physiological factors in endurance of athletes. The research material included 30 competitive (boys) kayaker with average age 18.05 ± 2.3 and body height 170.85 ± 6.45 cm, body mass- 70.3 ± 4.3 kg) divided into 2 groups of 15 subjects each. One group received a supplement called Phyto tonic (include of Ginseng, Ginkgobiloba, fenugreek seed, sour orange peel, *Tribulus Terrestris*; and Echinacea and Glucose); another group received a placebo containing Lactose and Spinach, which was treated as a control group. The experiment carried out for 4 weeks during which all subjects performed six sessions training weekly and four specific strength workouts. VO_2 max (based on **Broce protocol**) and blood profile Lactate were evaluated before and after the cessation of the experiment. The Spss17 software was used for analyzing the data. In addition, t-student tests were done to compare the groups. The results indicate that the blood lactate levels of the experimental was lower than those of the control group ($P < 0.05$) and Phyto tonic Supplement significantly ($P < 0.05$) improved the VO_2 max in the first group [1, 2].

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OCIMUM BASILICUM HYDROALCOHOLIC EXTRACT ATTENUATE MORPHINE WITHDRAWAL SIGNS IN MALE MICE

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The effect of *Ocimum basilicum* hydroalcoholic extract on morphine withdrawal signs in male mice was investigated. Dependence was induced by injection of morphine (s.c.) three times daily at 50, 50 and 75 mg /kg, respectively, for 3 days. On day 4, after the last administration of morphine, different concentration of *Ocimum basilicum* (5, 10 and 20 %, i.p.) were administered 30 min before naloxone (5 mg/kg, i.p.) challenge [1]. Withdrawal signs recorded as number of jumping, and the sores of 0 to 3 for grooming, teeth chattering, rearing, writhing, diarrhea, wet dog hakes and climbing during 30 min [2]. Our results showed that different doses of *Ocimum basilicum* compared to control group significantly can attenuate morphine withdrawal signs such as number of jumping ($P < 0.05$ and $P < 0.01$), grooming ($P < 0.05$) teeth chattering ($P < 0.05$), rearing ($P < 0.05$), climbing ($P < 0.05$), and diarrhea ($P < 0.05$) except writhing and wet dog shakes. In conclusion it seems that terpenes (e.g. Linalool) of *Ocimum basilicum* can attenuate morphine withdrawal signs, but further studies need to be carried out to better understanding this mechanism [3-5].

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EFFECTS OF TURMERIC (*CURCUMA LONGA*) POWDER ON PERFORMANCE AND CARCASS TRAITS OF BROILER CHICKENS

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The rhizome of *Curcuma Longa* is a medicinal plant extensively used in India, China and South East Asia for treatment of various diseases [1]. This study was conducted to investigate the effects of Turmeric powder (TP) on performance and carcass traits of broiler chickens. One hundred and twenty Ross 308 male broiler day old chicks were randomly assigned into 3 treatments (control diet, control diet + 5g TP/kg and control diet + 10g TP/kg) and 4 replicates consisting of 10 birds. Data were analyzed according to a completely randomized experimental design. Feed intake, body weight, body weight gain and feed conversion ratio recorded weekly. At the end of the experiment (d42), three chickens from each replicate of treatments were weighed and slaughtered for carcass traits. Results showed that the feed intake was significantly decreased in the 5g and 10g groups ($P<0.05$). In the 5g and 10g groups, body weight and body weight gain were significantly increased ($P<0.05$). A significant improvement was observed for feed conversion ratio in 10g group ($P<0.05$). The thigh, breast, gizzard, and duodenum relative weights and ileum relative length were not significantly affected by treatments. The liver, jejunum and ileum relative weights, duodenum and jejunum relative lengths and carcass yield were significantly increased in the 5g and 10g groups ($P<0.05$). The abdominal fat and relative weight of heart in the 10g group were significantly lower than other treatments ($P<0.05$). Result of this experiment showed that Turmeric powder could affect the performance and some carcass traits of broiler chickens.

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EFFECTS OF TURMERIC (*CURCUMA LONGA*) POWDER ON SOME BLOOD PARAMETERS AND OXIDATIVE STRESS IN BROILER CHICKENS

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Turmeric, the rhizome of *Curcuma Longa* is belong to ginger family, *Zingiberaceae* and is one of the well-known and important spice crops in Asia [1].

The present research aimed to evaluate the hematological and biochemical changes and adverse effects of different levels of Turmeric powder (TP) on oxidative stress in broiler chickens. For this purpose 120 day old Ross 308 male broiler chicks were randomly divided into one control and two treatment groups (control diet, control diet + 5g TP/kg and control diet + 10g TP/kg), and 4 replicates consisting of 10 birds. Data were analyzed according to a completely randomized experimental design. At the end of the study (d42) blood and serum samples were collected from three chickens in each replicate. Analysis of obtained data revealed that The Alkaline Phosphatase, Aspartate aminotransferase activity, High Density Lipoprotein concentration and Glutathion Peroxidase were significantly increased in the 5g and 10g groups, ($P<0.05$). The number of leukocytes and neutrophils were higher in the two groups that treated with turmeric (5g & 10g), ($P<0.05$). The lymphocyte count and Triglyceride concentration in the 10g group were significantly lower than 5g and control groups ($P<0.05$). The erythrocyte, eosinophile and monocyte numbers, Low Density Lipoprotein and Albumin concentration, Alanine aminotransferase activity and Superoxide dismutase significantly decreased in the 5g and 10g groups ($P<0.05$).

Results showed that the Turmeric powder has various effects on hematological, biochemical and oxidative stress in treated broiler chickens.

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EFFECT OF MYCORRHIZAL FUNGI AND SALICYLIC ACID ON MORPHOLOGICAL PARAMETERS AND PHOTOSYNTHETIC PIGMENTS IN *OCIMUM BASILICUM* UNDER SALT STRESS

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Iran, by having eleven climatic regions and more than 8000 plant species, is a growing place of 1400 medical species and is a suitable place for accessing to valuable and scarce medical species. In this study, the effect of pretreatment with *Glomus mosseae* and *Glomus intraradices* and salicylic acid (0/2mM) on resistance of green basil plant toward salinity (resulting from sodium chloride) was compared. Basil plants are sensitive against NaCl, these plants were cultivated in culture medium (in perlite) in green house condition. The trial was performed in a random – two factors designs. The results showed that salinity decreased inoculating percentage in root, root length, fresh and dry weight of aerial organs and root and pigments in basil plant. In pre- treated plants with salicylic acid (0/2mM) or mycorrhizal fungus, root length, fresh and dry aerial organs and root and photosynthetic pigments content were increased in plants that subjected to NaCl. Our results showed that pretreatment with salicylic acid was better effect against salt stress in this plant than inoculating with arbuscular mycorrhizal fungus.

EVALUATION OF MEDICINAL PLANTS USED TO TREAT DIABITES AND THE GENERAL METHOD OF THEIRS PRESCRIPTION, FROM THE PRESPECTIVE OF TRADITIONAL MEDICINE OF IRAN

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Diabetes mellitus is a common metabolic disorder characterized by increased blood sugar (hyperglycemia). The classic symptoms of diabetes mellitus include polyuria, polydipsia and weight loss. The texts of Iranian traditional medicine refer to the ziabites disease that its symptoms like to the classic symptoms of diabetes. According to this Contents, a study on medicinal plants used to treat diabetes, was performed.

This study is a literature review that is Survey Results of ten major and valid books of Iranian traditional medicine. The medicinal plants recommended in the ziabites treatment was extracted from the books, Then, in order to obtain scientific material related to herbal medicine (phytotherapy), some herbal medicinal books reviewed and information about scientific articles obtained by studying some of the Iranian traditional medicine journals and searching through Pub med, Iran medex, SID, Google Scholar.

Results: According to the study of major books of Iranian traditional medicine, ziabites disease is divided into two kinds of hot and cold. In Iranian traditional medicine to treat the two kinds of disease in the use of medicinal plants, the patients temperament (nature), the disease temperament and the drugs temperament are considered and different treatments are recommended in various temperament that this recommendations according to review of scientific articles and content related to herbal medicine (phytotherapy) are largely confirmed.

Prescription of medicinal plants in Iranian traditional medicine to treat diabetes is according to the patients' temperament, the disease temperament and the drugs temperament and is avoided of the same and similar prescriptions in various temperaments. Also, according to scientific articles, including articles that refers to temperament theory and pharmacogenetics theory, drug Prescription for a specific person with specific disease, is emphasized. Despite of this Content, in herbal medicine (phytotherapy), regardless of temperament theory, the same and similar prescriptions is recommended to control diabetes. It is considerable that to achieve more effective and less complicated herbal treatment, different prescriptions are recommended in various temperament and the same and similar prescriptions should be avoided in various temperament.

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COMPARE THE CONTENT OF QUALITY AND QUANTITY CHARACTER OF ESSENTIAL OIL OF
TEUCRIUM ORIENTAL IN VEGETATIVE PLACES OF LORESTAN PROVINCE

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This research was performed for the detection, quantitation of essential oil and identification of components of different ecotype of *Teucrium orientalis*. Identifying different species of *Teucrium* genus and detecting its growth regions in the wild nature of Lorestan province were also followed. Mountain germander (*Teucrium orientalis*) is a perennial plant from Labiateae family and has a high distribution in Lorestan but rarely makes a plant type in the plants population of this province [1].

The survey showed that there are 4 species from genus of *Teucrium* with scientific names of *Teucrium orientalis*, *Teucrium polium*, *Teucrium melissoide* and *Teucrium stocksianum* in Lorestan province, among them the two first are the main species. The results showed that between three surveyed regions of Khorramabad, Aleshtar and Kuhdasht, the amounts of essential oil were 0.8, 0.6 and 0.09%, respectively. It was found that the ecotype of Khohdasht is better than the other ecotypes regarding the percent of essential oil (0.7 %) and number of chemical components (27 chemical compounds) identified by a GC-MS method. It may be concluded that one should use the ecotype of Khohdasht for production of chemical substances such as Cavacrol, α -Camphene, Valencene, β -Caryophyllene, Bicyclogermacrene, Myrcene and Sabinene.

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ANALYSIS OF THE ESSENTIAL OILS OF TWO *THYMUS* SPECIES FROM LORESTAN PROVINCE

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The genus *Thymus* L. (Labiatae) consists of about 215 species of herbaceous perennials and subshrubs. The Mediterranean region can be described as the center of the genus [2]. This genus is represented in Iranian flora by 14 species, four of which (*Thymus carmanicus*, *Thymus daenensis* subsp. *Daenensis* and *T. daenensis* subsp. *lancifolius*, *Thymus persicus* and *Thymus trautvetteri*) are endemic. The Persian name of the genus is "Azorbeh" and/or "Avishan" (Mozaffarian, 1998). In this study since 2009 to 2010, 2 Species *Thymus* in Lorestan province. The essential oils obtained from the aerial parts of *Thymus daenensis* subsp. *daenensis* and *Thymus fallax* were analyzed by using GC and GC/MS [1]. Twenty two compounds representing 97.3% of *T. daenensis* subsp. *daenensis* oil were identified. The main ones were Thymol (63%), *p*-Cymene (5.6%), τ -Teripinene (7, 2%), and Carvacrol (14.5%). Twenty three one components accounting for 98.7% of *T. fallax* oil were identified. The major constituents were Thymol (47.9%), Carvacrol (19%), τ -Teripinene (9.7%) and *p*-Cymene (7.1%). Both oils were found to be rich in monoterpene phenols, especially Thymol and Carvacrol.

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COLLECTION AND IDENTIFICATION OF MEDICAL PLANTS OF LORESTAN PROVINCE

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This project achieve in different places of Lorestan province during 4 years for collection of medicinal plant germplasm. In total 217 sample seed were collected to 40 zones of lorestan province samples were consist of 21 families, 37 genus and 38 spices that Compositae, Labiateae and Papilionaceae family were the most number. In Totally, among zones were very rich of medicine germplasm including of Zagheh, Dareh takht (Azna), javanmard (Alshtar) and Razan zones. In other zones such as Nojian (khorram abad), Aligoudarz and ect. were rich germplasm medicinal plants in years ago but un happily because problems consist of climate changes, over grazing and unauthorized harvesting by user extinction and being cut off. These plants were concluding *Glycyrihza glabera*, *Hypericum perforatum*, *Tymus spp*, *Allium hirtifolium* and *Achillea philla* that pay attention to supply during field operation and extinction medicine plants to be prior to decay in condition of Lorestan province.



EVALUATION OF GENETIC DIVERSITY BASED ON AGRONOMIC TRAITS AMONG SOME CUMIN (*CUMINUM CYMINUM*) ACCESSIONS UNDER THE CONDITION OF KERMANSHAH, IRAN

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Cumin (*Cuminum cyminum*) is native to Mediterranean regions, belongs to Apiaceae family that has grown by people of Egypt and India since ancient time [2]. Diversity is bases for selection in plant breeding. Selection is required enough variation and by rising up genetic diversity in community, the choice widens [1]. In this present study, genetic diversity among different collected cumin population was assessed based on agronomic traits. The farm and laboratory sections of this research were conducted in a field located 10 km west of Kermanshah and Agronomy Laboratory, Campus of Agriculture and Natural Resources, Razi University of Kermanshah, Iran in 2011, respectively. In this study, the ecotypes were planted in plots of 1.5 × 1.5 m long. The row spacing and distance between plants were 30 and 5 cm, respectively. Agricultural operation performed under dry condition and all plants were treated in a uniform manner. The field result of analysis of variance and mean comparison showed significant differences among accessions regard to all treats. The highest yield was observed in Afghanistan accession (1215.3 kg/ha) while, the lowest one belonged to Shahdad accession (140.3 kg/ha). The Afghanistan ecotype also had highest number of Umbel per Plant (69.07) and Biological Yield (2347.6 kg/ha). Correlation analysis between various treats showed that there was a significant correlation among plant high with other treats including number of miniumbel in umbel (0.344) and 1000 weight seed (0.555). Cluster analysis based on agronomic treats placed all accessions into three groups. The first group accessions in term of treats such as Seed yield, Biological yield and Percent disease incidence were more similar than other treats. The third cluster single ecotype, showed a significant excellence concerning almost economically treats including Seed yield, Biological yield, plant height and number of umbel per plant. The other accessions in the second group were similar according to other treats.

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SUPPRESSIVE EFFECTS OF *HYPERICUM PERFORATUM* HYDROALCOHOLIC EXTRACT ON MORPHINE WITHDRAWAL SIGNS IN MALE MICE

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The effect of *Hypericum perforatum* (St. John's wort) hydroalcoholic extract on morphine withdrawal signs in male mice was investigated. It showed that antidepressant directly with their effect on opioid reward or indirectly with improve depression associated to opioid withdrawal can attenuate opioid abuse [1]. Studies showed the antidepressant activity of *Hypericum perforatum* specified in the forced swimming test (FST) [2]. Dependence was induced by injection of morphine (s.c.) three times daily at 50, 50 and 75 mg /kg, respectively, for 3 days. On day 4, after the last administration of morphine, different concentration of *Hypericum perforatum* hydroalcoholic extract (0.5, 1 and 2 mg/kg, i.p.) were administered 30 min before naloxone (5 mg/kg, i.p.) challenge [3]. Withdrawal signs recorded as number of jumping, and the scores of 0 to 3 for grooming, teeth chattering, writing, diarrhea and climbing during 30 min [4]. Our results showed that different doses of *Hypericum perforatum* compared to control group significantly can attenuate morphine withdrawal signs such as number of jumping (P<0.05), grooming (P<0.01 and P<0.05, respectively) teeth chattering (P<0.001), climbing (P<0.001), and diarrhea (P<0.05 and P<0.001, respectively) except writhing. It can be consulate that *Hypericum perforatum* may be by serotonin re-uptake and inhibiting MAO activity [5, 6] can be attenuate some withdrawal sings and so this extract can be useful for controlling some aspects of morphine withdrawal sings in morphine dependent subjects.

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**CALLUS INDUCTION AND GROWTH IN DIFFERENT EXPLANTS OBTAINED FROM
HAPLOPHYLLUM ROBUSTUM SEEDLINGS**

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The genus *Haplophyllum* (Rutaceae) contains 70 species distributed from the Mediterranean to East Siberia which are perennial herbs with a pervasive smell. The plants are widespread in Central Asia and so have been commonly used for a long time in folk medicine by the local population. In the earliest scientific literatures such as the Canon Medicine by Avicenna, it is indicated that "sadab-ruta" (the name given to different *Haplophyllum* species) could be applied for treating different diseases [1]. Iran with 26 species of *Haplophyllum* 14 of them are endemic is a major center of endemism of this genus [2]. The presence of alkaloids with different chemical structures, including quinolones, furoquinolines, dihydrofuroquinolines, tetrahydrofuroquinolines and pyranoquinolones were indicated in Uzbek *Haplophyllum* species [3]. Here, the effects of two hormonal treatments on percentage of callus induction and the growth speed of induced calli which produced from different types of explants (leaf, stem and root) is studied. The seeds of *Haplophyllum robustum* were collected from Semnan province, surface sterilized and cultured on B5 medium for explants preparation. Produced explants were cultured in B5 medium supplemented with (1) Kin, IAA and NAA in total concentrations of 0.2, 0.5 and 0.5 mg/L respectively and (2) 2,4-D, Kin, IAA and NAA in total concentrations of 2, 0.2, 0.5 and 0.5 mg/L respectively. Callus induction in all types of explants was observed in both treatments, but the first treatment was more effective in callus induction and growth.

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**EFFECT OF WATER DEFICIENCY AND NITROGEN APPLICATION ON WITHANIA SOMNIFERA
MORPHOLOGICAL TRAITS AND ROOT YIELD IN TABRIZ REGION**

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In order to study the effects of water deficiency stress on *Withania somnifera* morphological traits and root yield an experiment was performed in 2010. Field experiment was carried out by a split plot design with 3 replications. Main plot were in 2 levels (complete irrigation and water deficiency when 50% flowering until seed bulking stage and after that irrigation every 3 weeks), and sub plots were 2 levels (nitrogen fertilizer application up to 150 kg/ha, in two stages: 50% flowering and seed bulking and control without application). The results that obtained from data analysis of variance showed that irrigation significantly effect on plant height, root length, root diameter, root fresh and dry weight, percentage of dry matter and percentage of Withaferin A and so nitrogen application effect on plant height, root length, root diameter, root fresh and dry weight, percentage of dry matter and percentage of Withaferin A was significant. Interaction of irrigation and nitrogen on plant traits such as plant height, root dry weight, Teytophane, Nicotine, Tropine was significant. Results showed that in Tabriz region with drought and poor soil, every water and fertilizer deficiency led to decrease in yield and quality of *Withania somnifera*.

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STUDY OF ANTIMICROBIAL ACTIVITY FOR ESSENTIAL OIL OF *PTEROCARYA FRAXINIFOLIA* L. FROM NORTHERN IRAN

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P. fraxinifolia is an indigenous plant found in northern regions of Iran [1]. Native people use the leaves of this tree as an anesthetic agent for catching fish [2], dyeing and as an antifungal agent [3]. Juglone, a naphthoquinone compound, is found to exist in high amount in the leaves and hulls of *P. fraxinifolia* [4, 5]. Major components in the essential oil are Bisabolol oxide, Hexadecanoic acid Dihydroxypropyl ester; Bisabolone oxide, reported by Ebrahimzadeh M.A, et al. [6]. Based on our knowledge there is not enough reports about biological activity of this plant. In this study, leaves and stems of *P. fraxinifolia* were collected from Guilan, northern Iran, dried and extracted by simultaneous distillation–extraction (SDE) apparatus, antimicrobial activities of the mentioned oil were tested against some gram positive and gram negative bacteria via disk diffusion method and the activity was expressed as minimal inhibitory concentration (MIC) [7]. Results show that although essential oil of *P. fraxinifolia* is sensitive to many of examined micro organisms, its antifungal activity is high significantly.

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THE EFFECTS OF CHEMICAL, ORGANIC AND BIOLOGICAL FERTILIZERS ON GROWTH AND ESSENCE YIELD OF THYME (*THYMUS VULGARIS*)

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Nutritional management is one of the most important factors that affected on quality of medicinal crops. In this research the effects of chemical, organic and biological fertilizers on growth characteristics and essence yield of *Thymus vulgaris* based on factorial experiment were evaluated. The factors includes: chemical fertilizer (C_1 = control , C_2 = use of 100Kg.ha⁻¹ Nitrogen, 50Kg.ha⁻¹ Phosphorus and the same amount for Potassium). Vermicompost application ($V_1=0$, $V_2=2$, $V_3=4$, $V_4=6$ ton.ha⁻¹) and Nitroxin inoculants (N_1 =control, N_2 =inoculation). This experiment was carried out in 1389-90 growing season with three replication and include 48 plots. Each plots include 5 line of plants with 3 meters length. The results of experiment show that the effects of chemical fertilizer, vermicompost and nitroxin on plant height was significant. Also wet and dry weight of plants significantly affected by application of chemical fertilizers, vermicompost and nitroxin. Application of nitroxin increased wet and dry weight of plants about 6.6 and 4 percent, respectively. Application of chemical fertilizer increased dry weight of plants from 187.1 g.plant⁻¹ for control plots to 201 g.plant⁻¹ and in the case of wet weight this trait increased from 1091g.plant⁻¹ for control plot to 1185 g.plant⁻¹. With application of vermicompost dry weight of plants significantly increased in compared with control plots. Application of 2, 4, and 6 ton.ha⁻¹ vermicompost increased plant dry weight about 1, 2 and 9%, respectively. Also wet weight of plants significantly increased with application of 2, 4 and 6 ton.ha⁻¹ vermicompost. Wet weight of plants increased about 3.2, 7.2 and 12.3 percent with application of 2, 4 and 6 ton. ha⁻¹ vermicompost. The results of experiment show that essence yield of thyme plants increased about 30.5% with application of nitroxin. Application of chemical fertilizer significantly (about 13.81%) increased the plant essence yield. The effects of vermicompost application on essence yield was significant, so the application of 6 ton. ha⁻¹ vermicompost increased the essence yield from 1.42% for control plots to 1.83 percent (about 29%). Results of experiment show that the value of Thymol essence was varied from 44% to 49.75 % essence. The interaction of vermicompost and chemical fertilizer on thymol were significant. The highest amounts of Thymol essence derived from application of chemical fertilizer with 4 ton.ha⁻¹ vermicompost [1,2].

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STUDY THE EFFECT OF DIFFERENT CONCENTRATIONS OF NaCl ON GERMINATION
CHARACTERISTICS OF FENNEL (*FUENICULUM VULGARE*)

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Fennel (*Fueniculum vulgare*) is an old valuable medicinal plant from Apiaceae family. Some reports are indicated to salinity effect on yield and growth of this plant. Salinity stress influences on important factors like percentage of germination and speed germination. Therefore, in order to study the effect of different concentrations of NaCl on germination characteristics and to determine the threshold salinity for germination of Fennel, an experiment was conducted in complete randomized design with 6 treatments (0, 2, 3, 4, 6, 8 ds/m) and 4 replications in laboratory of Islamic Azad University, Mashhad Branch in 2011. After 10 days percentage of germination, speed germination, root length, stems length and seed vigor indices were measured and data were analyzed with MINITAB. Results obtained from variance analysis showed a significant difference in (<0.01) level for percentage of germination and a significant difference in (<0.05) level for other measured indices. Results obtained from mean comparison between treatments, showed a significant decrease in more than (3ds/m) concentrations for percentage of germination, speed germination and seed vigor indices. Also, it showed that (3ds/m) concentration doesn't have a significant difference with control for all measured indices. Therefore, it is concluded that the threshold salinity for germination of Fennel is (3ds/m).

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LEAF AND WOODY BRANCH ANATOMY OF TWO SUBSPECIES OF *FRAXINUS EXCELSIOR* L.
(OLEACEAE) IN IRAN

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Fraxinus excelsior L., ash, from Oleaceae, is distributed in north and northwest of Iran. The medicinal product of the bark and leaflets obtained from the leaves, contain coumarin derivatives (fraxoside, fraxetol, isofraxetol), flavonoids (rutin), catechic tannin, pentacyclic triterpenic acids (ursolic acid), mannitol, inositol, glucose, organic acids, volatile oil, gums. It has diuretic, diaphoretic, laxative, analgesic, anti-inflammatory, and uricosuric properties, used in the treatment of gout, arthritis, arthrosis, rheumatism, lithiasis, into the formula of laxative purgative powder and rheumatic tea [1, 2]. Azadi (2005) considering the existence of the hair on the petiole and rachis, divided this species into two subspecies: *F. excelsior subsp. excelsior* and *F. excelsior subsp. coriariifolia* [3, 4]. In this study we investigated the anatomical features of leaf (leaflets, rachis, hair) and woody branch structure in the two subspecies. The rachis has nearly circular shape, with flat adaxial side and modified by two latero-adaxial wings. Epidermal cells are isodiametric with thin cuticle. Under the epidermis is a zone of two–three layers of collenchyma. The hypodermic area continues with a meatus-type parenchyma, which bounds the conducting fascicles to their abaxial side. Phloem ring appears interrupted from place to place. In *F. excelsior subsp. coriariifolia* hairs on the rachis are clearly visible while in *F. excelsior subsp. excelsior* the hairs on rachis are not obvious. In the leaf's limb conducting fascicles in mid rib from adaxial are distinctively separated by lignified rays. There are two layers of palisade cells in the leaf's limb. The upper epidermis of *F. excelsior subsp. coriariifolia* is covered with hairs while in *F. excelsior subsp. excelsior* there are few hairs just around the mid rib. The hairs are of two kinds: linear and secretory. In cross sections of branch, cork layer is clearly visible and in some parts lenticel is obvious. Cork cambium and bast fibre, phloem, cambium layer and xylem are observed respectively toward the center of the stem. In both phloem and xylem the pith rays are visible. The central pith comprises parenchyma cells.

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EFFECT OF LEAD ON SEED GERMINATION CHARACTERISTICS OF BASIL (*OCIMUM BASILICUM L.*) AND MUSTARD (*SINAPIS ARVENSIS*)

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Environmental pollution by means of heavy metals is one of the most important environmental problems in Iran and around the world. Lead is an important pollutant metal which can contaminate environment especially agricultural soils. Lead absorption by common agricultural crops may cause different health problems for human and domestic animals. While, cultivation of medicinal and aromatic plants in polluted area for phytoremediation and secondary metabolite component production such as volatile oils can be an alternative approach to eliminate this problem [2]. In order to assess germination properties of Basil (*Ocimum basilicum L.*) and Mustard (*Sinapis arvensis L.*) in response to five concentrations of lead, an experiment was carried out in Crop Physiology Laboratory, Faculty of Agriculture, Ferdowsi University of Mashhad in 2010. Treatments were arranged in a factorial layout based on a completely randomized design (CRD) with 3 replications. The experimental treatments were all combination of two medicinal plants (Basil and Mustard) and five concentrations of lead (0, 100, 300, 600 and 900 ppm).

For each treatment 50 seeds were put on Wattman paper No.4 in Petri dish. Seeds were irrigated with $PbCl_2$ (2^{cc} for each Petri dishes) with different mentioned lead concentrations. Petri dishes were put inside of an incubator and temperature was adjusted on 25°C. Effect of both plant species and lead concentrations were significant ($p < 0.01$) on all studied characteristics. Germination percent of Basil seeds was decreased significantly in 300 ppm of lead concentration. Application of high concentration of lead (more than 300 ppm) had no significant effect on Mustard seed germination percent. Root and shoot length, fresh and dry weight of basil seedlings significantly decreased by 300 ppm lead or more concentrations. Increasing lead concentration decreased seed germination speed in both Basil and Mustard. This reduction was greater in Basil than Mustard. Germination Index was higher in Mustard than Basil in all concentration of lead. Our results showed that Mustard was more resistant than Basil to lead in terms of germination characteristics. This resistance may be caused by increasing of antioxidant enzymes reaction in lead stress.

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EXTRACTION AND IDENTIFICATION OF MAIN STEROLS FROM ROOTS OF *SALVIA HYPOLEUCA* PLANT

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This research, the roots of *Salvia hypoleuca* Benth were collected during the flowering stage from Tehran province and dried in root temperature and shad condition. The dried roots cut to small pieces and extracted with ethyl acetate solvent. The main sterols were separated and isolated by column and thin layer chromatography. Solid, colourless and chloroform soluble Sitosteryl oleate with $R_f = 3.5$ was separated and identified by silica gel steady phase and hexane- ethyl acetate (2:8) reverse phase. Also, colourless and chloroform soluble Sitosteryl and stigmasterol with $R_f = 1$ were separated and identified by silica gel steady phase and hexane- ethyl acetate (2:8) reverse phase [1, 2]. The isolated compounds were recognized and confirmed by spectroscopic methods (¹HNMR, ¹³CNMR) [3].

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EXTRACTION AND IDENTIFICATION OF *AMMODENDRON PERSICUM* PLANT COMPOUNDS BY GC-MS

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Ammოდendron persicum species with the local name Dievdar, Firewood, lightwood, and sand tree belongs to Papilionaceae sub-family and Fabaceae (Leguminosae) family. The habit of this plant is on sand dunes and sand soil in Zeirkouh Qhaen that could tolerate harsh climate [1]. *A. persicum* has special extractive material which could withstand under drought stress and low water condition. The wood of trunk and root of trees collected from above mentioned region and dried in room temperature. The dried wood was peeled and cut into the small pieces and the chips ground to powder. The powder wood of trunk and root was extracted using acetone by socialite as describe by T 207-OM97 standard test method. The percentage of wood extract for trunk and root were 5.86 and 4.56 respectively. Identification of the chemical compounds in the extractive samples carried out using GC- MS. Totally, 13 compounds in trunk and 11 compounds in root were characterized with different amount. The most frequent compound in trunk and root were quazoun with 40% and okata dekanamids with 160.2%, respectively. The amount of cellulose, lignin, hemi-cellulose and ash were 38.85, 29.8, 24.69 and 0.8 percent for trunk and were 41.5, 22.7, 29.2, and 0.2 percent for root as determined by TAPPI standard test methods.

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EFFECT OF EARTHWORMS (*EISENIA FETIDA*) ON CADMIUM UPTAKE FROM POLLUTED SOIL BY BASIL (*OCIMUM BASILICUM* L.)

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Industrial and agricultural activities cause to metal pollution of soils. This is a serious environmental problem. The reduction of heavy metal exposure by conventional procedures is expensive [1]. Phytoremediation of soils is a plant-based technology that aims to volatilize, stabilize, degrade, extract or inactivate the pollutants in the soil [2]. The main goal of this experiment was investigation of earthworm effect on cadmium uptake from polluted soil by means of basil (*Ocimum basilicum* L.) An experiment was set up in research green house of Agriculture faculty, Ferdowsi University of Mashhad in 2010. This experiment was performed in factorial basis on complete randomized block design with three replications. The first factor was soil with basil without earthworm (B), soil with earthworm without plant (E), soil with basil plus earthworm (B+E) and Control soil without earthworm and plant (C). The second factor was cadmium concentration with 3 levels consists on 0, 10 and 20 mg/kg in soil. Experiment was conducted in pots with silty loam soil. The solution of CdCl₂ was added to all air-dried samples of soil except for control. Earthworms application in soil and their activities significantly increased dry matter, leaf yield, essential oil percentage and essential oil yield in B and C treatment but decreased these traits in B+E in all concentrations of cadmium. Interaction of A (B, E, B+E and C) vs. B (Cadmium concentrations) was significant. Application of cadmium in both concentrations (10 and 20 ppm) cause to decrease significantly leaf yield and essential oil yield, but these concentrations had no significantly effects on leaf yield and essential oil yield in the absence of earthworms. This result indicated the earthworms may release more amount of cadmium already had fixed to soil particles into soil solution. Thus medicinal plant can absorb greater amount of metal from soil. This important property increases the efficiency of phytoremediation.

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LEAD UPTAKE OF ARBUSCULAR MYCORRHIZAL CHAMOMILE COLONIZED IN AMENDED SOIL WITH ORGANIC MANURE

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A glasshouse pot experiment was conducted to study the effect of chamomile mycorrhization, by the two different isolates arbuscular mycorrhizal fungi (AMF) *Glomus mosseae* and *Glomus intraradices* on physiological properties of chamomile plants in soil experimentally contaminated with four Pb levels (0, 100, 500 and 1000 mg kg⁻¹). Present study also investigated the effects of organic manure to improve lead stress tolerance. The results showed mycorrhizal inoculation substantially improved plant P nutrition. Pb concentrations in shoots of chamomile were significantly decreased and other physiological properties increased as compared to that of without the addition of organic manure. Thus, organic manure might be a better fertilizer for phytostabilization than chemical fertilizer in contaminated soil. We suggest that under an elevated Pb condition, mycorrhizal and organic manure could promote plant growth by increasing P uptake and mitigate Pb toxicity by sequestering more Pb in roots. The results indicated that chamomile is tolerant to this metal but isn't a hyper accumulator [1-10].

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EVALUATION OF DROUGHT STRESS TOLERANCE AND SUSCEPTIBILITY INDEXES IN MEDICAL FENNEL (*FOENICULUM VULGARE* MILL)

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In order to identify and select accessions tolerant to drought in medical Fennel plant based on stress tolerance and susceptibility, eight accessions of genus *Foeniculum vulgare* were evaluated under drought stress and non-stress conditions in field experiments. Planting conditions till flowering stage were similar under drought stress and non-stress treatments, for induction of stress treatment; irrigation was stopped with flower initiation. Based on seed yield, six tolerance and susceptibility indexes were calculated. Analysis of variance of stress tolerance and susceptibility showed significant differences among accessions for all indexes of MP, GMP, HAR, STI, SSI and TOL. Mean comparisons in field experiment showed that accession of Varzaneh and Esfahan except indexes of SSI and TOL, in other indexes appropriate the maximum rate to themselves. Analysis of correlations in both experiments showed that indexes of MP, GMP and STI were the best indexes for sieving tolerance Fennel accessions under both drought stress and non-stress conditions. Based on drawn 3-D biplot with use of first and second components also accession of Varzaneh and Esfahan were introduced as the most tolerant accessions and the drawn dendrogram in cluster analysis approved this result.

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OPTIMIZATION OF *IN VITRO* SHOOT INDUCTION BY DIFFERENT CONCENTRATION OF VITAMINS AND SUCROSE IN ST. JOHN'S WORT (*HYPERICUM PERFORATUM*)

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Hypericum perforatum L. is one of the important medicinal plants known as "St. John's wort" in Western Europe and used in the treatment of mild to moderate depression. There are a few reports about *in vitro* micropropagation of *Hypericum perforatum*. In order to approach optimal sucrose and vitamins concentrations for *in vitro* micropropagation of *Hypericum perforatum*, the seterill single node explants were cultured on MS medium with 8 combinations of MS vitamins (Thimine, Pyridoxine and Nicotinic Acid) and two concentrations of sucrose (30 and 40 g l⁻¹). Data analysis shown that shoots, leaves and nodes number as well as shoots and leaves length were significantly influenced by vitamins combinations and sucrose interaction (p<0.05). The highest number of shoots and leaves were achieved when explants were culture in media included 40 g l⁻¹ sucrose with 100fold of MS vitamins. When the media supplemented with 30 g l⁻¹ sucrose, the highest length of shoots and leaves were obtained. Increasing the number of shoots and leaves in media included 40 g l⁻¹ sucrose, correlated with high Pyridoxine concentration. However, high shoot and leaves length in 30 g l⁻¹ sucrose, correlated with high Thiamine and Nicotinic acid concentration.

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EFFICACY OF CLOVE OIL (*EUGENIA CARYOPHLLATA*) AS AN ANAESTHETIC FOR TWO SIZE OF *KUTUM* (*RUTILUS FRISII KUTUM*)

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The object of this study was to evaluate the efficacy of clove oil (*Eugenia cryophyllata*) as an anaesthetic for two size of *Rutilus frisii kutum* with average body of 2±33 and 13±4g and establish the minimum concentration producing desirable anaesthetic effects and survival time on those concentrations. Fish were exposed to concentrations varying from 0.044 to 0.4 mg/l with bath immersion way at 23°C and under acceptable water quality conditions. Behavioural changes, the time loss of equilibrium, deep anaesthesia, recovery, responsiveness to stimuli and also mortality were determined. The behavioural responses to anaesthesia appeared to be the same in both sizes. They continued to swim after losing equilibrium and for recovery they first regained equilibrium and then began swimming slowly. Induction time decreased and recovery time increased with increasing concentrations. Longer exposure time to anaesthetics after deep anaesthesia resulted in an increase in recovery time. The minimum concentration producing desirable anaesthetic effects was 0.044 mg/l. In addition induction time decreased and survival increased in larger fish classes. No mortality was observed. These findings suggested that clove oil could be use as an effective anaesthetic for longer exposure time in size of 2-13 g for *Rutilus frisii kutum*.



INHIBITORY EFFECTS OF HYDROALCOHOLIC EXTRACT OF *FERULA GUMMOSSA* BOISS. ON GERMINATION AND GROWTH OF WEEDS

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In order to study the inhibitory effect of hydroalcoholic extracts of *Ferula gummosa* on germination and growth of four weeds (*Avena fatua* L., *Chenopodium album* L., *Setaria viridis* L. and *Amaranthus retroflexus* L.) this experiment was conducted in laboratory and greenhouse. Treatments were 0.1, 0.25, 0.5, 1, 2.5 and 5% extract of *F. gummosa* and distilled water (control). Hydroalcoholic extracts of dried powdered of root and fruits of *F. gummosa* were obtained by percolation method. According to the results, extracts significantly inhibited seed germination of weed species and the degree of inhibition increased with increasing concentration of extracts. Laboratory results indicated germination percentage and radicle and plumule lengths of weed species were reduced more than 50% by all extracts in comparison with control. According to the results of greenhouse experiments seedling emergence percentage, fresh and dry weight and height of weed species significantly reduced by using hydroalcoholic extracts. According to laboratory results percentage of seedling emergence was the most adverse affected trait from extracts. Greenhouse results confirmed that germination of *A. retroflexus*, *C. album*, *S. viridis* and *A. fatua* seeds at 1% concentration reduced 76%, 65%, 42% and 55% respectively in comparison with control. In general, emergence percentage and height were strongly affected by extract levels, especially levels upper than 1%. Results showed, *A. retroflexus* was the most sensitive to extracts, because they had the lowest value in measured factors. Many researches revealed that sesquiterpene lactones and alkaloids formed an important group of compounds involved in allelopathy [1] and there are some reports that seed and root of *F. gummosa* showed the presence of large amounts of terpenoids and alkaloids [2]. Therefore, extract of *F. gummosa* might be useful as natural herbicides and might contain numerous growth inhibitors that could be used for the development of biological herbicides.

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GERMINATION IMPROVEMENT IN SEEDS OF *DOREMA GLABRUM* FISCH. & C.A.MEY.

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In order to survey the effects of dormancy breaking treatments on germination of *Dorema glabrum* Fisch. & C. A. Mey, a completely randomized design was implemented at four replications. Seeds collected from Jolfa in East Azerbaijan. Dormancy breaking treatments were included: gibberellic acid soaking (500 and 1000 ppm), leaching (24 hours), KNO₃ (0.3%) soaking, prechilling (4, 8 and 12 weeks), GA₃ soaking (500 or 1000 ppm) + leaching, GA₃ soaking (500 or 1000 ppm) + prechilling (4, 8 and 12 weeks), leaching + prechilling (4, 8 and 12 weeks), prechilling (4, 8 and 12 weeks) + KNO₃ and KNO₃+leaching. Seeds were placed in plastic Petri dishes (50 seeds/petri dish) on top of one sheet of moistened filter paper and placed in a growth chamber. Germination conditions were adjusted as 25°C and 80% humidity for 21 days. Measured traits were: germination percentage, mean germination time (MGT), germination rate, seed vigor index, radicle length, plumule length, fresh and dry weight of seedlings. Results showed significant differences between dormancy breaking techniques. The highest germination percentage, germination rate and the lowest mean germination time belonged to 1000 ppm GA₃ + prechilling for 8 weeks and 1000 ppm GA₃+ prechilling for 12 weeks treatments, respectively. Gibberellins overcome seed dormancy and bud dormancy in many species, acting as a substitute for low temperatures, long days or red light [1]. Dormant seeds which require chilling, dry storage after ripening and light as a germination stimulator are often treated with GA₃ to overcome their [2]. This experiment showed that prechilling and GA₃ had main role on breaking of seed dormancy, so it is known that dormancy is physiological and it is related to embryo and inhibitor factor or both of them.

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EVALUATION OF BOTANICAL TRAITS, ESSENTIAL OIL AND CHEMICAL COMPOSITION IN *THYMUS CARMANICUS* JALAS. ECOTYPES

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The genus *Thymus* L. is represented in Iranian flora by 18 species, four of which (*T. carmanicus*, *T. daenensis*, *T. persicus* and *T. trautvetteri*) are endemic [1]. In this study, botanical traits, oil content and chemical composition of *T. carmanicus* Jalas. ecotypes are evaluated in natural habitats of Iran. Ecotypes of *T. carmanicus* were collected from Karkas-Kuh (Natanz area, Province Isfahan), Shirkuh (Tezerjan area, Province Yazd), Abr-Kuh (Shahrud area, Province Semnan), Rayen and Sirch (Province Kerman). Oils were extracted by hydrodistillation method for 3h and its constituents determined by GC and GC-MS. The essential oils content (v/w%) of Kerman-Rayen, Kerman-Sirch, Yazd, Semnan and Esfahan ecotypes at flowering stage were 2.5%, 1.9%, 2.0%, 1.8% and 1.5%, respectively. 34, 36, 37, 38 and 33 components were identified and quantified in oil samples of Kerman-Rayen, Kerman-Sirch, Yazd, Semnan and Esfahan ecotypes, representing 98.7, 98.9, 96.9, 92.3 and 98.2% of these oils, respectively. According to results Carvacrol was the major compound in all landraces. The ranges of major constituents were as follow: Carvacrol (42.0–80.7%), p-Cymene (2.5–12.8%), γ -Terpinene (3.7–7.3%), Thymol (4.1–11.8%) and Borneol (3.1–8.3%). It was established that the production of phenolic compounds is favored in warmer and drier climatic zones while other, nonphenolic compounds usually accumulate in higher quantities in cooler and damper areas [2] which is in agreement with our results. In general, essential oils of *T. carmanicus* are rich in monoterpene phenols (especially, Thymol and Carvacrol) and due to this high phenol content, they can be considered as substitutes for *T. vulgaris* (common thyme) oil for medicinal purposes and other applications. In addition, the Iranian *T. carmanicus* may be a potential Carvacrol source for commercial cultivation.

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BIODIVERSITY AND FLORISTIC STUDY OF THE MEDICINAL PLANT SPECIES OF KAZEROON COUNTY

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Little is known about medicine and pharmacology in Iran in pre-Islamic times. The traditional Iranian pharmacology in the Islamic period was based on Hippocratic and Galenic concepts of medicine [1]. Kazeroon County is situated at a west in fars province, with an area of about 4060 km²[2]. This area is important for plant biodiversity, due to the presence of some important habitats such as international Lake of Parishan in the southeast, woodlands of *Quercus persica* in the east and branches of Shahpoor River in the west of the region [3]. Therefore for the old antiquity on this city and high biodiversity on plant species, in this work the medicinal vascular plants of this region were collected, identified and studied for medicinal usages. For this purpose, many specimens were collected during the vegetative seasons in 2006 till 2009. All the specimens were prepared as standard herbarium sheets, identified by using available references and stored in the herbaria of Research Institute of Forests and Rangelands (TARI) and Payam Noor University. Life forms and chorological status of the species were also analyzed.

As a result, 90 species belonging to 87 genera and 39 families of angiosperms were reported from the rangelands around the Kazeroon. Lamiaceae, with 11 species, and Asteraceae with 9 species were the largest families respectively, and *Plantago* (Plantaginaceae) with 3 species was the largest genus in the medicinal flora of this area. Phytogeographically, 51.11% of species (46 species) were Irano-Turanian elements and from the standpoint of plant life forms, about 50% species (45 species) were Therophytes. The presence of more than 90 medicinal plant species indicates high biodiversity in the studied region. Furthermore, the findings of this investigation are completely in conformance to the conditions of the area that has a semi-arid climate with dry summers and low rainfall.

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STUDY THE QUALITATIVE AND QUANTITATIVE OF ESSENTIAL OIL OF *SATUREJA RECHINGERI* FROM SEVEN DIFFERENT HABITATE IN ILAM PROVINCE

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Satureja rechineri is one of the worth *Satureja* species in Iran, that growth as an endemic plant in Ilam province (Jamzad 1996). This species in vegetative form and percentage of main chemical component is near to *S. Khuzestanica*. In order to study the qualitative and quantitative of essential oil of this plant to find the best chemotype of its different population.

The aerial parts were collected in full flowering stage from seven different habitation in Ilam province. The specimen were dried in laboratory, the essential oils were isolated by hydro distillation and analyzed by capillary GC and GC-MS. The oils yield of collected specimen and percentage of their main component (Carvacrol) respectively were Ban Roshan (2.9% , 94.4%), Havian (3.2%, 95.6%), Pir Mohammad (3.6% , 95.1%), Tange-bina (3.0%, 94.6%), Dinar kuh (2.1%, 95.5%), Zarinabad (3.7%, 95. %2) and Paqale (2.2%, 92.5%).

The highest oil yield was obtained of Zarinabad 3.7% and the least oil belongs to Paqale 2.2%. The highest percent of Carvacrol was belonging to Havian 95.6% and the least percent obtained of Paqale specimen 92.5%. To compare with other *Satureja* species essential oil yield and the rate of its main component Carvacrol, *S. specigeri* (3.8%, 4.0%), *S. sahandica* (1.5%-2.9%, 0.7%-1.3%), *S. intermedia* (1.5%, 0.8%), *S. macrantha* (1.4%, 4.0%), *S. mutica* (2.3%, 30.9%), *S. khuzestanica* (3.0%, 29.6%), *S. bachtiarica* (1.6%-3.0%, 29.7%-66.5%) and *S. hortensis* (1.7%, 41.2%), (sefidkon et al, 1383), showed that *S. rechingeri* is one of the worth *satureja* species in world that can be introduced as a rich Carvacrol source.

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KARYOLOGICAL CHARACTERISTICS IN SEVERAL POPULATIONS OF *PAPAVER FUGAX*

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Genus *Papaver* has the highest level of botanical and phytochemical variability, taking up many species with numerous subspecies and varieties yielding approximately 170 alkaloids from 13 alkaloid groups [1]. In this study, karyological characteristics of six populations of *Papaver fugax* collected from various geographical locations of northwest of Iran were investigated using Aceto-Iron-Hematoxylin staining. Karyological characteristics including chromosomes number, chromosomes length, long and short arms length, arm ratio index, relative length of chromosomes and total length of chromosome set were measured in 12 mitotic cells. The results showed that all of the populations were diploid ($2n=2x=14$), with one pairs of metacentric and six pairs of submetacentric chromosomes. Chromosome 1 had a secondary constriction and satellite at the end of its short arm with 1.215 μm of length. The arm ratio index of chromosomes ranged from 1.47 in chromosome 1 to 2.65 in chromosome 3. In all of the populations, chromosome 1 had the lowest arm ratio index. According to asymmetry indices, the category of all populations is same and placed on 3A class of Stebbins [2] asymmetry categories with minor variations among the populations. Karyological characteristics of all materials studied were similar to each other; however, there were some variations among populations on chromosome arm ratios and relative lengths.

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CLINICAL SIGNS OF ACUTE AND SUB-ACUTE TOXICITY OF *ADONIS AESTIVALIS* IN RABBIT

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Adonis aestivalis is a native medicinal plant to Europe and Asia. It belongs to *Ranunculaceae* family that contains high level of cardiac glycosides. *Adonis aestivalis* hydroalcoholic extracts (AAHE) of aerial parts of the dried plants obtained by 70% ethanol were concentrated in an evaporator so a deep dark brown semi-solid residue was achieved. Healthy albino mice weighing 20–33 g, and New Zealand rabbits (1.8 - 2.2 kg), of either sex, were obtained from Pasture Institute (Iran). All animals had free access to tap water and standard rodent diet. To acute intra-peritoneal toxicity and behavioral activity investigation appropriate concentrations of extract dissolved in saline containing 0.1, 1.6, 2.9, 3.5 and 5.0 g/kg of AAHE were given intraperitoneally to 6 groups of 5 mice each. The animals were observed for symptoms of toxicity and mortality within 24–72 h and continued for 14 days to confirm the number of animals per dose that remained alive [1]. LD₅₀ was calculated based on Lorke's method [2].

For sub-acute toxicity rabbits were used. Fourteen days were allowed for the animals to adapt to the controlled diet and experimental conditions. Animals were randomly allotted into two experimental and control group of 8 animals each. The experimental group was injected (1 ml/kg) 250 mg/kg extract intraperitoneally; the rabbits in the control group were received equal volume of normal saline for six consecutive days. [3]. The acute intraperitoneal toxicity (LD₅₀) of AAHE in mice was 2150 mg/kg. The mortality rate of 0% at and up to a dose of 1500 mg/kg gradually rose to 100% at 5000 mg/kg. The no-observed-adverse-effect level (NOAEL) for the intraperitoneal dose was 1000 mg/kg, while the lowest-observed-adverse-effect level (LOAEL) was 1600 mg/kg. Some clinical signs, such as salivation, hypoactivity, ataxia, and recumbency were seen immediately after the intraperitoneal injection, while others (deceased appetite and weight loss) were observed soon after, and were more pronounced at the higher doses.

AAHE -treated rabbits show decrease in body weights. Toxic symptoms including depression, drowsy, lethargy, panting, anorexia, hypoactivity, salivation, asthenia, recumbency, emaciation, diarrhea, syncope with diminish of body temperature lower than 35°C lead to death. Moreover, lethality time was 108 ± 20.74 h for 250 mg/kg-treated group during the 6 days of observation.

These primary data indicated that *A. aestivalis* contain toxic components thus the popular therapeutic utilization of the plant in traditional medicine must be used cautiously.

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ANTIDIARRHOEAL ACTIVITY OF THE ESSENTIAL OIL OF *BUNIUM PERSICUM* (BOISS) SEEDS

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Bunium persicum Boiss. is a native medicinal plant of Iran. It belongs to *Apiaceae* family and its fruits contain high level of essential oils. The essential oil of *B. persicum* (EOBP) was extracted by Clevenger apparatus using hydrodistillation. A total of eighteen compounds, representing 96.14% of the oil were identified by gas chromatography/mass spectrometry (GC/MS) reported previously [1]. LD₅₀ was calculated based on Lorke's method [2].

To antidiarrhoeal effects investigations adult Wistar rats weighting 210-250 g of either sex were starved for 18 h prior to the commencement of the experiment but were allowed free access to water. Animals were randomly divided into four groups of eight rats each. EOBP (20–80 mg/kg) was suspended in 2% Tween 80 and administered *via* intra-peritoneal (i.p) route to rats. The animals in group I received 10 mL/kg i.p. of 2% Tween 80, while those animals in groups II and III received the EOBP 20 and 80 mg/kg i.p. The last group received loperamide 5 mg/kg i.p. After 30 min of drug pre-treatment, castor oil (2 mL/rat) was administered intragastrically. The animals were placed in individual cages over clean filter paper. Four h after oil challenge, the rat cages were inspected hourly for the presence of the characteristic diarrhoeal droppings. Additionally the following parameters were determined: the first diarrhoea observing time, the weight and total number of diarrhoeal faeces excreted by the rats. The percentage inhibition was calculated as a function of the castor oil control % inhibition = control-test × 100%/control [3, 4].

The LD₅₀ was 455 mg/kg. Castor oil caused diarrhoea in all the animals in control group during 60±3 min. after oil challenge for up to 3h. The vehicle (1% Tween 80) did not show any antidiarrhoeal effect. EOBP 20 mg/kg show inhibition against castor oil-induced diarrhea for 96±12 min. and produced a significant increase in onset of diarrhoea. Lower dose of EOBP also reduced the number and weight of wet stools but did not have any significant effect. While higher dose 80 mg/kg was inhibited castor oil-induced diarrhoea significantly (P<0.05) as any of animals weren't show diarrhoea during four hours inspection. In comparison with loperamide, the reference antidiarrhoeal agent, the higher dose of EOBP demonstrates same effective protection alongside castor oil induced diarrhoea. These primary data indicated that the plant contained antidiarrhoeal constituents thus tend to support the popular therapeutic use of *B. persicum* in traditional medicine for gastrointestinal disorders.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF TURMERIC RHIZOME POWDER ON PERFORMANCE, CARCASS CHARACTERISTICS AND SOME BLOOD PARAMETERS OF BROILER CHICKENS FED CORN-SOYBEAN MEAL BASED DIETS

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In order to study the effect of turmeric rhizome powder (TRP) on performance, carcass characteristics and blood parameters of broiler chickens, an *in vivo* experiment was conducted. A corn- soybean meal based diet containing levels of TRP (0.00, 0.25, 0.50 and 0.75%) was used. In a completely randomized design with four treatments of five replicates each, and 10 chickens per replicate, 200, Ross male broiler chickens from 0-49 days were studied. For performance, feed intake and body weight gain recorded weekly. For carcass characteristics, at the end of experiment at 49 days of age, one chicken from each replicate of treatments were weighed, slaughtered and the relative weight of liver, pancreas, spleen, heart and abdominal fat pad measured. By Roche colour fan, skin colour was also measured. For measuring blood parameters

(albumin, total protein, total cholesterol, HDL and LDL-cholesterol and triglyceride) at 21, 35, and 42 and red blood cells, hemoglobin and hematocrit value at 21 and 42 days of age, serum blood samples from each replicate of treatments were collected.

In all weeks the amounts of feed intake, weight gain and feed to gain ratio in broilers fed treatments were not significantly different. Addition of TRP into the diets significantly ($P<0.05$) decreased relative abdominal fat pad and heart weights to live body weight. Inclusion of TRP into the diets significantly increased total cholesterol, HDL-cholesterol and hemoglobin and decreased LDL-cholesterol, VLDL-cholesterol and red blood cells at 42 days of age ($p<0.05$). TRP also significantly decreased blood albumin ($p<0.05$).

Under the conditions of this experiment, it was concluded that TRP may improve carcass quality and leaner meat would be predictable. Use of TRP as a reducing heart weight factor, may show some improve in circulatory and respiratory systems that needs to be clarified and finally, TRP might have some positive effects on health status of the broiler chickens.

EFFECT OF ARBUSCULAR MYCORRHIZA ON *MENTHA SPICATA* L. NUTRIENT UPTAKE

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Mentha spicata L. (Mint) is a medicinal plant and one of 25 species in the genus. Its essential oil is used in food, pharmaceutical and cosmetic industries [1]. Recently, the use of arbuscular mycorrhiza (AMs) as biological composts for the production of medicinal plants has been developed [2]. AMs enhance plant growth and rooting through increased absorption of water and nutrients, and plant growth hormones [3]. In this study, two species of AMs (*Glomus etunicatum* and *G. mosseae*) were used to survey inoculation effects on growth parameters of three mint genotypes (Esfahan, Yazd and Kerman). Percentage of colonization, morphological properties and amount of P at shoots were measured. Results showed that growth factors such as roots and shoots height, number of leaflets, wet and dry weights and amount of P were significantly increased in inoculated plants compared to controls.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE CORRELATION BETWEEN PROLINE CONTENT AND CALLUS PERCENTAGE IN SAFFRON

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Saffron is dried stigmas of *crocus sativus* L. and member of Iridaceae family which is propagated with means of corms, because it is a sterile plant and can't produce seeds. Each mother corm produces 8-9 cormlet every year. Corms are faced with much stress, such as water deficiency, during its development. Biochemical investigations are playing the predominant role in improving the quality of yield such as saffron. The corms of saffron with immatured flora bud were collected on October from two distinct areas, Torbat and Tehran with 75% and 50% clay content in soil, respectively. The proline content of corms from two areas and also free and combined water of both soils were measured. Then an experiment was set up using MS medium supplemented with BAP and NAA 10mg/L from each with two parts of immatured flower (ovaries and styles) from those areas. Proline is one of the metabolites which were produced by some plants when they were faced with water stress. The aim of these studies is to show the correlation between amounts of proline content of corms and percentage of clay content of soils from one side with free and conjugated water and percentage of callus which were obtained from tissue culture by using two segments. The results indicated that the highest proline content (0.012 mg.dw⁻¹) was obtained from corm of Torbat with highest clay that gives rise to lower callus formation on tissue culture (26%). Also the results of free and conjugated water test confirm that the soil of Torbat had much higher amounts of clay than Tehran.

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THE EFFECT OF DIFFERENT SEED PRIMING TECHNIQUES ON GERMINATION, YIELD AND ESSENTIAL OIL OF MILK THISTLE

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Milk thistle (*Silybum marianum* L.) is a thistle of the genus *Silybum* Adans., a flowering plant of the daisy family (Asteraceae). They are native to the Mediterranean regions of Europe, North Africa and the Middle East. For many centuries extracts of milk thistle have been recognized as "liver tonics." Research into the biological activity of silymarin and its possible medical uses has been conducted in many countries since the 1970s, but the quality of the research has been uneven. Milk thistle has been reported to have protective effects on the liver and to greatly improve its function. It is typically used to treat liver cirrhosis, chronic hepatitis (liver inflammation), toxin-induced liver damage including the prevention of severe liver damage from *Amanita phalloides* ('death cap' mushroom poisoning), and gallbladder disorders.

In this study, effects of seed priming techniques in different priming periods and osmotic potential levels on milk thistle were studied in two different experiments. The first experiment was aimed to evaluate seed priming effects on seed germination in laboratory. Germination test was carried out in a completely randomized design including 88 treatments in 4 replications. Combination of treatments consisted of osmopriming with PEG₆₀₀₀ solution, halopriming with different salt solutions (NaCl, KCl, CaCl₂, KNO₃, KH₂PO₄, MgSO₄) in 4 osmotic potential levels (-0.25, -0.5, -0.75, -1 Mpa) and hydropriming with 3 priming periods (12, 24, 36 h).

The best priming techniques selected and then tested in farm condition. These treatments were consisted of halopriming with 4 salt solution (NaCl, KCl, CaCl₂ and KNO₃) in 2 priming periods (12, 24 h) and two osmotic potential levels (-0.25, -0.5 Mpa) and hydropriming, that were carried out in randomized complete blocks design with 3 replications. Result showed that priming techniques significantly differed for most of the studied characters. The most effective combination of treatments was halopriming with solution -0.5 Mpa of CaCl₂ in 24 hours.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



STUDY AD COMPARISON OF α -BISABOLOL OXIDE B AND CAMPHOR IN FLOWER AND LEAF ESSENCE OF *TANACETUM PARTHENIUM* (L.) IN TWO DIFFERENT ELEVATION IN SOUTH OF GOLESTAN PROVINCE

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In this study in order to determine and comparison of α -Bisabololoxide B and camphor Camphor in flower and leaf essence of *Tanacetum parthenium*(L.) , some samples were gathered from Draznou Mountain with 2200 m elevation and Ziarat region with 1200 m elevation situated in south of Gorgan. Primarily gathered flowers and leaves dried in shadow and after that operation of distillation with water carried out and separately essence were accured. These essences injected to Gas Chromatograph instrument joined to GC/MS.

Results showed that total essence belonged to plant in Ziarat region with 1100 m elevation from sea level containing α -Bisabololoxide B as much as 10.5% and Camphor as much as 53.3%.

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EFFECTS OF SALINITY AND DROUGHT CONDITIONS ON GERMINATION AND SEEDLING GROWTH OF *CUMINUM CYMINUM* L

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The genus *Cuminum* belongs to family Apiaceae. *Cuminum cyminum* L. is annual herb and the only species from the genus *Cuminum* that is found in Iran [1-2]. In order to investigate the effects of drought due to PEG 6000 and also salinity caused by NaCl on germination and seedling growth of Clary, two different experiments were carried out based on a completely randomized design with 4 replications. In the first experiment the effect of various drought levels (0,-0.5, -2, -2.5, -4, -4.5, -6, -8 bar) and in the second one the effect salinity levels (0, 60, 120, 180, 240, 300, 350 mM) on germination percentage, germination rate, seedling length and seedling dry weight were determined. The results showed that with increasing drought and salinity, all measured characteristics significantly decreased. Maximum and minimum germination obtained at control and treatment of -8 bars and 350 mM, respectively. Water potential significantly reduced seedling length and seedling dry weight. Based on this result, *Cuminum cyminum* is a tolerant medicinal plant to salinity and drought even at germination stage.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



COMPARATIVE STUDY OF *FUMARIA PARVIFLORA* (PAPAVERACEAE) POPULATIONS IN IRAN

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There is a high level of phenotypic plasticity in *Fumaria* species. The environment has a strong influence on the physical expression of their traits. In Iranian folk medicine, *Fumaria parviflora* is used for dermatological diseases, stimulation of liver function and gall bladder, as anti-scorbutic, anti-bronchitis, diuretic, expectorant, anti-pyretic, diaphoretic, appetizer and anti-neoplastic. In this study plant materials were collected during March – May, 2008 – 2010 from five different provinces of Iran. Different morphological features were measured and evaluated. Fruit anatomical studies were conducted by hand - made cross sections. Total seed oil and fatty acid compositions of different accessions were investigated by using GC techniques in order to provide additional information for the delimitation of the taxa. Anatomical observations in different accessions of these varieties show some variations in fruit surface texture, ornamentations and fine characters of fruit apex. Varieties show differences in their fruit apex shape, keels and also their surface ornamentations. It has some varieties which are recorded here for the first time for the flora of Iran as *F. parviflora* var. *accuminata*, *F. parviflora* var. *symei* and *F. parviflora* var. *indicoides*. Morphological and fruit anatomical variations of these varieties in Iran have been studied. The diagnostic characters are the fruits keels and form of apex. Fruit anatomical and morphological results are in concordance with fatty acids results. As their differences are more than is expected for varieties a modification in their taxonomic rank to subspecies in Iran is also proposed.

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STUDY AND QUALITATIVE COMPARISON OF ALKALOIDS, FLAVENOID, TANNIN AND SAPONINE OF *TANACETUM PARTHENIUM* L. INSIDE FLOWERS IN TWO DIFFERENT REGIONS OF GOLESTAN PROVINCE

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The fever few (*Tanacetum parthenium* L.) belongs to Asteraceae sect and Anthemideae family which is the most important species of medicinal aromatics and usually growth in many wide and shiny forests, Rockies & hilly regions with 500-2250 m height. In this research the flower of herbal plant were collected from two natural regions like as hilly Ziarat (1100 m) and Mountainous Deraznoo (2200 m) and after drying were extracted with Ethanol.

The research was based on studying of relationship between environmental shocks and generation, formation and gathering of metabolites in leaves and flowers of the plant. A qualifying test of total Alkaloids and Flavenoids showed that the most alkaloids are found in Ziarats flowers and the least in Deraznoo's.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECTS OF DROUGHT STRESS ON MORPHOLOGICAL AND BIOCHEMICAL CHARACTERISTICS OF SARVORY (*SATUREJA HORTENSIS* L.)

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The drought stress is an important factor on plant growth. On other hand, *Satureja hortensis* belong to lamiaceae family and is used as spice and drug. In this research, the effects in water stress on growth, yield, metabolites (protein, sugars, prolin, chlorophyll, proxidase and catalase enzymes) were studied. Complete randomized design with 5 treatments and 3 replications used in 2011. Water deficit levels included control (100% field capacity), mild stress (80% field capacity), medium stress (60% field capacity), severe stress (40% field capacity) and ultra severe (20% field capacity). The statistical analysis showed that deficit had significant effect on growth parameters, yield biomass, metabolites. Water stress decreased plant height, dry and fresh weight air organisms and root height. Biochemical changes such as the amount of prolin, soluble sugars and proxidase enzyme in leaf and root increased and the concentration of plant pigments such as a, b chlorophylls, insoluble sugars, protein, catalase enzyme in leaf and root decreased. Accumulation of prolin and soluble sugars is a widespread plant response to environmental stress. Decreasing of the plant pigment is due to the chlorophyll decomposer enzymes [1, 2].

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THE SURVEY ON EFFECTS OF IRRIGATION AND SPRAYING OF MICRONUTRIENTS ON THE VEGETATIVE GROWTH COMPONENTS OF BLACK CUMIN (*NIGELLA SATIVA* L.)

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In order to survey the effects of Irrigation and spraying of micronutrients on vegetative growth components of black cumin (*Nigella sativa* L.), an experimental design was conducted in research farm of North Khorasan agricultural and natural resources research center in Bojnourd in 2009. Experimental design was a split plot based on randomized complete block design with three replications. The main factors were irrigation intervals in three levels ($I_1=7$, $I_2=14$, $I_3=21$ days) and the sub factors were spraying micronutrients included M_1 = control (no spray), M_2 = spraying with the Zinc (concentration of three parts per thousand), M_3 = spraying with the Boron (concentration of two parts per thousand), M_4 = spraying with the Iron (concentration of four parts per thousand) and M_5 = spraying with the mixture of above elements. Experiment results showed that the impact of irrigation intervals on plant height, branch number, number of capsules per plant and biological yield was significant and decreased with increasing irrigation intervals. The effects of spraying of micronutrients on plant height, branch number, number of capsules per plant, biological yield and Fe, Zn, and Br concentration in plant organs was significant. Spraying of micronutrients caused plant height, branch number, number of capsules per plant, biological yield and Fe, Zn, and Br concentration in plant increased. Spraying of micronutrient and irrigation interaction on plant height and biological yield were significant. Seven days irrigation intervals and spraying the mixture of micronutrients treatment caused the highest plant height, biological yield and Fe, Zn, and Br concentration in plant organs.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE SURVEY ON EFFECTS OF IRRIGATION AND SPRAYING OF MICRONUTRIENTS ON
YIELD AND ESSENTIAL OILS OF BLACK CUMIN (*NIGELLA SATIVA* L.)

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COMPETITIVE EFFECTS OF WEEDS ON THE GROWTH CHARACTERISTICS, FLOWERS
YIELD AND ESSENTIAL OILS OF MARIGOLD (*CALENDULA OFFICINALIS* L.)

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This experiment performed to investigate the competitive effects of weeds on the growth characteristics, flower yield, and essential oils of Marigold (*Calendula officinalis* L.) during 2006 and 2007 in the research farm of Ferdowsi University of Mashhad, Iran. A split plot in randomized complete block design with three replications was conducted. The main plots consisted of three levels of weed-control included without weeding (control), once weeding and twice weeding during the growing period. Sub-plots were density of plants per square meter, include 20, 40, 60 and 80 plants per square meter. Analysis of variance results showed that the effects of weeding and planting density on growth characteristics and flowers yield per unit area was significant. However, no significant effect on the percentage of essential oils showed. The highest flower yield per unit area in treatment of twice weeding and plant density of 80 plants per square meter was obtained. Twice weeding treatment and density of 60 plants per square meter had good performance and no significant difference with the previous level. The lowest yield in 40 and 20 plants per square meter, and no weeding treatments were obtained with other treatments were statistically significant differences. Interaction of density and weeding showed that in low density treatments (40 and 20) plants per square meter, the positive effect of weeding on vegetative parameters and flower yield of marigold was most evident. High density treatments showed better competition against weeds. The effects of twice weeding in densities of 60 and 80 plants per square meter on vegetative parameters and flower yield of marigold were no statistically significant.

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CYTOTOXIC ACTIVITY OF TWO SPECIES OF *ZIZIPHORA* FROM QAMSAR

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The present study was designed to investigate the cytotoxic activity of the aerial parts of two species of *ziziphora* from labiate family. Labiateae family consists of four species in Iran (*Z. clinopodioides* Lam.; *Z. capitata* L., *Z. persica* BUNGE. and *Z. tenuior* L.) that widespread all over Iran. *Z. clinopodioides* and *Z. tenuior* with the common Persian name “kakuti-e kuhi” and “kakuti” respectively; are endemic species grows wild in Iran and also Afghanistan, Iraq, and Talish [1]. The cytotoxic activity of the extracts was investigated by using Brine shrimp lethality bioassay. LC₅₀ values of methanol extract of *Z. clinopodioides* and *Z. tenuior* were 1000 µg/ml and 800 µg/ml respectively. Cytotoxic activity of the extracts may be correlated with the presence of trichosanthin in the plant. Trichosanthin is a ribosome inactivating protein which shows antitumor, immunosuppressive and HIV-1 inhibitor activity by cleaving the supercoiled doublestranded DNA [3, 4].

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THE EFFECT OF DIFFERENT EXTRACTION PROCEDURES ON THE ROSMARINIC AND CAFFEIC ACID CONCENTRATIONS OBTAINED FROM *MELISSA OFFICINALIS*

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Melissa officinalis (lemon balm) is a medicinal plant traditionally used to ameliorate the cognitive deficits associated with Alzheimer's disease [1]. Previous studies were performed on the extraction of active compounds of this plant by absolute ethanol [2, 5] or water: ethanol [4]. This study was carried out to investigate the effect of different extraction procedures for rosmarinic acid (RA) and caffeic acid (CA) as the major active components of Melissa leaves, obtained from Shahid Beheshti Medicinal Plants farm. The water as a solvent, and also different extraction methods of reflux, soxhlet and ultrasonication were applied for preparation of aqueous extracts. The amount of total phenolic and total flavonoid content of extracts were evaluated using gallic acid equivalents by folin-ciocalten test and colorimetric assay respectively [2, 3]. Also, the extracts were screened for their possible antioxidant activity by DPPH (free radical scavenging) method [2]. Moreover, a High-performance liquid chromatography (HPLC) coupled with diode array detector DAD was used to determine RA and CA. The results indicated that the maximum concentrations of 76.27 mg of RA and 2.38 mg of CA could be obtained from 1 g of dried materials by using water as the solvent and soxhlet extraction technique. Comparing different extraction procedures, it has been found that aqueous extraction by soxhlet could lead to the maximum RA and CA extraction efficiencies compare to other procedures.

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THE EFFECT OF APPLICATION OF IRON SULFATE AND ZINC SULFATE ON YIELD, ESSENTIAL OIL AND CHAMAZULENE CONTENT OF GERMAN CHAMOMILE (*MATRICARIA CHAMOMILLA*)

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Chamomile [*Matricaria chamomilla*] (Asteraceae) belongs to a major group of cultivated medicinal plants. It is an important medicinal and aromatic plant of both traditional and modern systems of medicine. For adequate plant growth and production, micronutrients are needed in small quantities; however, their deficiencies cause a great disturbance in the physiological and metabolic processes in the plant.

In order to study the application of iron sulfate and zinc sulfate on yield, essential oil and chamazulene content of German chamomile, two field experiments were carried out in 2008 and 2009 at the Research Station of the of Agriculture, University of Tabriz, Iran. Experiments were arranged as complete block design with four replicates. Treatments were foliar application of Iron sulfate and Zinc sulfate separately and combined together at stem elongation, flowering, and both stages with a control. Seeds of chamomile (*Matricaria chamomilla* L.) obtained from Hungary were sown directly in rows of prepared plots in May 2008 and 2009. The plots were 4x2 m with 6 rows, 0.30 m row distance and 0.10 m seed distance. Harvested Flowers dried in a shady place and prepared for essential oil extraction. The flowers essential oil content was extracted by water distillation. The essential oils were analyzed by GC/MS.

The results showed that the most yield of dry flower (2125kg/ha) and essential oil percentage (1.05%) were observed in foliar application by iron sulfate and zinc sulfate at both stages of stem elongation and flowering. the most percentages of chamazulene (5.89%) was obtained from the plants sprayed by iron sulfate at stem elongation that was 33.84 percent more than control (4.41 %). But the lowest percentage of chamazulene (3.91%) was obtained from the plants sprayed by zinc sulfate at stem elongation (33.84 percent lower than control). Micronutrients especially iron and zinc act as metal components of various enzymes or as functional, structural, or regulatory cofactors. Thus, they are associated with saccharide metabolism, photosynthesis, and protein synthesis.

According to the results iron sulfate and zinc sulfate can considerably improve the flower yield, essential oil and chamazulene content of chamomile.

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QUALITATIVE PHYTOCHEMICAL ANALYSIS AND EVALUATION OF PHENOLIC CONTENTS OF METHANOL EXTRACT FROM *ZIZIPHORA TENUIOR* L.

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Natural products especially phenolics, flavonoids, carotenoids, alkaloids in plants have attracted a great interests due to their well-known biological properties. These interests, has recently been focused on addition of polyphenols to foods, drugs and biological systems, to scavenge free radicals [1]. In this research work, Aqueous and ethanol extracts of *Z. tenuior* were prepared using soxhlet, phenolic compounds were evaluated using Folin-Ciocalteu method, based on the reduction of phosphor-wolframate-phosphomolybdate complex by phenolics to a blue reaction product [2- 4]. Extracts were also examined for having active compound classes [5], tested via Mayer, Wagner, hydrochloric acid reagent, gelatine-salt block, gelatin block and Ferric Chloride qualitative assays.

Results show that *Z. tenuior* have a large amount of total phenolics and flavonoids, exhibited via hydrochloric acid reagent test, but are not rich from other kind of organic natural compounds.

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16, 17 May 2012
Kish Island



NANOEMULSIFICATION OF *EUCALYPTUS GLOBULUS* ESSENTIAL OIL; THE IMPACT ON THE ANTIBACTERIAL ACTIVITY

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The leaves of *Eucalyptus globulus* is among the most prescribed herbal medicines for upper respiratory tract infections and inflammatory conditions [1]. In this work, an o/w nanoemulsion of eucalyptus oil in water was prepared using a mixture of non-ionic surfactants (i.e. tween80 and span80) as emulsifier and sonication technique. The nanoemulsions were prepared using 20% w/w oil, 79% w/w water and 1% w/w mixture of surfactants. The effect of the surfactant concentration on the droplet size and size distribution was investigated using Dynamic Light Scattering (DLS) technique [2]. The physicochemical stability of the nanoemulsions were investigated for 3 months by monitoring the EO content of the nanoemulsions with gas chromatography (GC) and droplet size by DLS, respectively. The antibacterial activity of the essential oil and the nanoemulsion was then compared against a range of pathogenic bacteria's including *Streptococcus pneumoniae*, *Pseudomonas aeruginosa*, *Haemophilus influenza* [3]. Minimum inhibitory concentration (MIC) and minimum bactericidal concentrations (MBC) were determined for pure essential oil (4 to 64 mg/ml), whereas these values were significantly reduced to 0.0156 to 0.5 mg/ml for nanoemulsion preparations. This indicates a major improvement in the antibacterial activity of *E. globulus* EO in nanoemulsion formulation.

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LONG-TERM APPLICATION EFFECT OF SEWAGE SLUDGE AND CHEMICAL FERTILIZER ON PHYSIOLOGICAL PARAMETERS IN BASIL (*OCIMUM BASILICUM* L.)

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Using sewage sludge as a fertilizer is economical approach, nutrients enriched and a new option for sludge disposal and recycling. Many previously researches represented a significant increase in nutrient concentration in soil and plant by sewage sludge application [1- 3]. In order to evaluate the long-term effect of different sewage sludge amounts alone and plus with chemical fertilizer on physiological parameters in basil, a field experiment was done. Experiment was arranged as split plot based randomized complete block design with three replications during 2009. Main plots consisted of six levels of fertilizers (control, recommended chemical fertilizer or CF as 70, 60 and 50 kg ha⁻¹ of urea, potassium sulphate and superphosphate triple, respectively, sewage sludge as 20 and 40 ton ha⁻¹ either enriched with either ½ CF or non-enriched) and four application periods i.e. one (2006), two (2006-2007), three (2006-2008) and four (2006-2009) continuous year. Results of ANOVA and mean comparison showed that interaction effect of two factors were significant for all traits (leaf area index, leaf to stem ratio, chlorophyll a to b ratio, chlorophyll a+b and dry matter yield) except SPAD value. Accordingly, maximum amount of a +b chlorophyll, leaf area index and a/b were obtained with application of 20 ton ha⁻¹ sewage sludge enriched by 50% chemical fertilizer during four (2006-2009), three (2006-2008) and two (2006-2007) continuous years, respectively. Also, application of 40 ton ha⁻¹ sewage sludge in two continuously years markedly increased dry mater yield (up to 300%) compared to control.

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PROTECTIVE EFFECT OF ALCOHOLIC EXTRACT OF *CANNABIS SATIVA* LEAVES ON ALPHA MOTONEURONS AND ANTI INFLAMMATORY EFFECT ON GLIALS FOLLOWING INDUCED DEGENERATION IN SCIATIC NERVE OF RAT

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Cannabinoid compounds are endowed with pharmacological properties that make them interesting candidates for therapeutic development [1, 3]. The experimental evidence supporting this hypothesis that *Cannabis sativa* has neuroprotective and anti-inflammatory effects on neurons and glials [2, 3]. So in this study we investigated protective effect of alcoholic extract of *Cannabis sativa* leaves on alpha motoneurons and anti-inflammatory effect on glials following induced degeneration in sciatic nerve of rat.

This experimental research was carried out on thirty two male Wistar rats. Animals were divided into four groups each consisting eight members; A: control, B: compression, C: compression + treatment with 25 mg/kg alcoholic extract, D: compression + treatment with 50 mg/kg alcoholic extract. Sciatic nerve compression of right thigh was done for 60 seconds. The first extract injection was done intra peritoneally immediately after compression and the second intra peritoneal injection was done a week later. 28 days after compression, the lumbar spinal cord was sampled. The density of alpha motoneurons and glials was measured using dissector method then data was analyzed with use ANOVA statistical test and Tukey test.

Neuronal density had a meaningful decrease in compression group comparing control group ($p < 0.001$) and glials density in compression group had a meaningful increase than control group ($p < 0.001$). Neuronal density in C and D groups showed a salient increase comparing compression group ($p < 0.001$) and this increase in treatment C is more than treatment D ($p < 0.05$). Glials density in C and D groups didn't show meaningful difference comparing compression group.

Cannabis sativa leaves alcoholic extract with specified doses have protective effects and this result probably issued of anti-apoptotic factors extant in alcoholic extract. Alcoholic extract hadn't any effects on glials density, maybe anti-inflammatory effects in alcoholic extract have been induced via sensation on cannabinoid receptors not glials density that need more research [2,3].

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EFFECT OF BIOLOGICAL AND NON-BIOLOGICAL FERTILIZERS ON THE GROWTH CHARACTERISTICS AND QUALITY OF THE SAGE (*SALVIA OFFICINALIS*)

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The effects of non-biological and biological fertilizers on the growth characteristics and crop quality of sage (*Salvia officinalis*) were studied in a pot experiment in a randomized complete block design with 13 treatments and 4 replicates between 2009 and 2010. Treatments consisted of different fertilizers include: 1-compost + superphosphate + normal urea, 2-compost + super phosphate + urea + urea coated with sulfur, 3-compost + biological phosphate + normal urea, 4-compost + biological phosphate + urea + urea coated with sulfur, 5-sheep manure + superphosphate + normal urea, 6-sheep manure + super phosphate + urea + urea coated with sulfur, 7-sheep manure + biological phosphate + normal urea, 8-sheep fertilizer + biological phosphate + urea + urea coated with sulfur, 9-cow manure + super phosphate + normal urea, 10-cow manure + super phosphate + urea + urea coated with sulfur, 11-cow manure + biological phosphate + normal urea, 12-cow manure + biological phosphate + urea + urea coated with sulfur and 13-control (soil zone). Characteristics measured were included the percentage of essence, leaf area, dry weight, shoot length, root length and leaf number. The highest leaf area, number of leaves, dry weight and percentage of essence in the twelfth treatment, maximum stem length in the fourth treatment and maximum root length in these treatments showed.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF IRRIGATION INTERVALS AND PLANTING DATE ON AGRONOMIC CHARACTERISTICS OF DEGEN & DRFI (*SECURIGER SECURIDACA* L.) IN BIRJAND REGION

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Degen & Drfi is a plant that has medicinal and nutritional importance. Degen & Drfi and countless of plants in this genus had application for medicinal uses such as weight loss and diabetes control. Its seeds also contain protein and lipids as well as some starchy foods are consumed. In order to investigate the effect of irrigation regime and planting date on agronomic characteristics of Degen & Drfi a field experiment carried out in region of kahi, Birjand, south Khorasan, Iran, 2010. The experiment was conducted in split plot design in a randomized complete block with four replications. Irrigation regime, including: I1- six, I2- twelve and I3- eighteen days' intervals as main factors and planting Date at four levels (20, 25, 30 April, and 5 May) were devoted to sub-plots. Analysis of variance showed that irrigation regime for all treatment, had more significant influence on trait including plant height, number of pods per plant, seeds per pod, biomass, grain yield and harvest index, and had significant influence on the yield of flowers per plant and weight seed. The highest amounts of each trait were gained from 12 days interval irrigation. The effect of planting date was significant in all treatment for all traits except 1000-seed weight. Planting in 20 April had highest values of characteristics. Interaction between irrigation and planting date were significant for number of stems, flowers and pods per plant, biomass, harvest index and grain yield at 1% and plant height at 5% level. The highest seed yield was obtained from irrigation in 12 days interval and planting in the 20 April. Results showed that irrigation in 12 days interval and planting especially in late April are the best treatment for Degen & Drfi production.

CHEMICAL COMPOSITION AND ANTIMICROBIAL PROPERTIES OF *SATUREJA POSTECHENARIA*

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The history of using medicinal plants, to treat diseases come back to the so far in past. In this study, we tried to use the *Satureja postechenaria* essential oils against two dangerous prevalent microbes *Candida albicans* and *Staphylococcus aureus*. For check the quality of the, Antimicrobial properties of essential oil disk diffusion method was used. To determine the quantitative the sensitivity of microbes to the essential oil and determine the minimal of concentration of essential oil. That prevents the growth of essential that Cause death of microbes, the successive rarity was used. The major combination of essential oil was including: Carvacrol 75.21%, Benzene-methyl 1-2 4.29% , *trans*-Caryophyllen 3.56%, γ -Terpinene 3.24%, Linalool 2.34%.

The results of disk diffusion method showed that the antibacterial effect of this plant is more typical than its antifungal effect. This plant has a MIC equal to the MBC. This amount was found of *Staphylococcus aureus* 0.5 micro liter of ml culture medium. And for *Candida albicans* was 0.2 on 1 μ L of mL [1].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



A REPORT OF THE CONTINUATION OF FLOWERING AND VEGETATIVE GROWTH AFTER SEED HARVEST OF THE FENNEL (*FOENICELUM VULGARE* MILLER) IN HOT SUMMER CONDITIONS IN AHWAZ

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In an experiment, Fennel compatibility was studied in a climate condition of Ahwaz. Fennel seed for sowing was Isfahan ecotype. Experiment location and sowing date was in trial field of Ramin University of Agriculture and Natural Resources (Khouzestan) and 5 December respectively. Flowering began in mid-spring and first seed harvest took place in late June. As regards, fennel is a Biennial plant, after the seed harvest was anticipated that the plant shoot will dry and then again vegetative growth beginning in the fall with cooler weather and Irrigation. But, Contrary to prediction, fennel remained green and flowering and seed production continued with the creation of new stem and leaf (re-vegetative growth). Ahwaz has a very high temperature in summer and the maximum temperature reaches above 50 degrees Celsius, so continue to grow of fennel in such circumstances was very interesting and unexpected. The flowering, seed production and vegetative growth continued in the summer and autumn of 2011 consistently. Such a condition can take several harvests and makes it possible to increase seed production per unit area. According to these results, fennel cultivation in the Khouzestan province will be very economical.

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EVALUATION OF ESSENTIAL OIL COMPONENT AND ANTIMICROBIAL PROPERTIES OF DIFFERENT PARTS OF *SALVIA OFFICINALIS* L.

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In order to check the ingredients and anti-microbial essential oils from *Salvia officinalis*, plants were studied in the two branches: leaves and flowers.

The increase of nosocomial systematic fungal infections due to pathogenic yeast, led to research on finding novel antifungals with potent inhibitory activity toward a wide range of pathogenic fungi. In this study, we evaluated the antifungal activity of the essential oil of *Salvia officinalis* L. leaves against standard species of *Candida albicans*, *Candida glabrata* and *Candida parapsilopsis* using both micro dilution assays.

The aerial parts of *Salvia officinalis* L. (SO) were collected from the field of pharmacological plants of Isfahan, central Iran, and its oil was produced in the Besat Research Center of Agricultural Faculty of Shiraz University, Iran, in January 2012. The essential oil was isolated by the hydro-distillation European Pharmacopoeia, using water as collecting solvent and analyzed by GC and GC-MS methods.

Comparing the efficacy of SO and antifungal agents in *C. glabrata*, SO was found to be more effective and in some cases as effective as antifungal agents against *Candida* spp. Therefore, lack of side effects can make SO as a good choice of antifungal agent.

Chemical analysis of SO revealed the presence of 41 components making up to 99.58% of the total oil. Cineole (13.69%), Borneol (13.77), α -Thujone (12.46%), Ledene (11.05%), β -pinene (7.00%), α -Humulene (6.92%), *trans*-Caryophyllene (5.28%), β -Thujone (4.56%), Camphor (3.58%), and Naphthalene (3.27%) were found to be the major components of the oil.

The oil extract of SO L. possesses good antifungal activity, and with naturally available materials, it could be a potential alternative substance to the existing synthesized antifungal agents.

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COMPARATIVE STUDY OF SALINITY EFFECTS ON TOXIC IONS, PHENOLIC COMPOUNDS AND OSMOLYTES IN TWO TABLE GRAPE (*VITIS VINIFERA L.*) GENOTYPES

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Soil salinity affects large areas of the world's cultivated land, causing significant reductions in crop yield [1]. The effects of salinity on toxic ions, phenolic compounds and compatible solutes of two table grape (*Vitis vinifera L.*) genotypes (Gharashani and Shirazi) were studied. These genotypes have been cultured in the zones around Urmia salt lake for several centuries. Own-rooted vines were grown in aerated Hoagland solutions and then salinity was applied as nutrient solutions containing 0 and 50 mM NaCl at different time points during a two week period. Toxic ion contents increased significantly in all vine parts with time passes. Chloride content in shoots of Shirazi was near two times higher than Gharashani, but inversely the roots of Gharashani had higher chloride content than Shirazi. Like chloride, sodium accumulated in all vine parts of two genotypes under salinity. Shirazi had higher sodium content in shoots and roots than Gharashani and Na⁺ accumulation exceeded that of Cl⁻ in all time points. It seems that the table grapes studied here has being adapted to salinity because of their ecological conditions. It has been indicated that phenylalanine ammonia-lyase (PAL; EC 4.3.1.5), a key enzyme in the phenyl propanoid pathway, could perform defense-related functions [2]. Increasing PAL protein amounts may enhance the accumulation of phenylpropanoids such as total phenolics. Phenylalanine ammonia-lyase and total phenolics increased in leaves of two genotypes with time passes. This increase was higher in leaves of Gharashani than that of Shirazi in all time points. Soluble protein contents fluctuated as first increasing and next decreasing in roots of two genotypes with time passes, although it increased in leaves. Soluble sugars and proline contents increased in roots and lamina under salinity. There were positive high correlations (p<0.05) between toxic ion contents and phenolic compounds and compatible solutes in two genotypes with time passes. Among two genotypes, Gharashani tolerated salinity in comparison to Shirazi, because it was able to restrict Cl⁻ uptake to lamina and had higher phenolic compounds and compatible solutes accumulation during salinity conditions.

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ANALYZING EFFECT OF AN EPIPODOPHYLLOTOXIN DERIVATIVE, ETOPOSIDE, ON BREAST CANCER CELLS DEATH THROUGH APOPTOSIS IN A NEW PATHWAY

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More than 760 published reports on the fragile histidine triad (FHIT) gene and its gene product Fhit have established its role in protecting against tumor development by control of cell cycle progression. Fhit is a mitochondrial protein that has been shown to induce apoptosis of and to reduce the tumor growth of epithelial cancer cells from lung, pancreatic cancer, cervical cancer, breast cancers and esophageal. The Fhit protein is a diadenosine triphosphate (Ap3A) hydrolase belonging to the histidine triad superfamily of nucleotide-binding proteins. Crystallographic studies suggested that Ap3A nucleotide-binding is crucial for Fhit biological activity and that enzyme-substrate complexes are appropriate signaling forms for blocking of the ATR-Chk1 signaling pathway. ATR-Chk1 signaling pathway plays a major role in the diminution of cell death in response to DNA damage and replication stress by down-modulation of Chk1 and up-modulation of Hus1. Hence, blocking of this pathway lead cells to apoptosis process.

Epipodophyllotoxin is a plant alkaloid naturally occurring in the root of American Mayapple plant (*Podophyllum peltatum*). A derivative of Epipodophyllotoxin is etoposide that acts as anti-cancer drug by inhibiting topoisomerase II. Recently, it is have been shown that etoposide increases free AP3A levels in Fhit-positive HEK293 cells and lead them to apoptosis process by blocking of the ATR-Chk1 signaling pathway. Hence, it is considered that etoposide plays another anti-cancer role in addition to its previous function.

In this project, MCF7, SKBR3 and MDA will be cultured in 70 plates at 37°C in 5%CO₂. Cells to be subjected to apoptotic treatments will be grown either for 16-19 h after seeding for 24 h treatments or for a further 24 h for shorter treatments. Cellular stress will be applied by supplementation of the growth medium by treating with cadmium acetate, etoposide, anti-Fas antibody and sorbitol, respectively. Cells will be cold-shocked by replacement of the medium for 30 min with ice-cold cold shock buffer. Cells will be harvested for analysis immediately after each treatment. It is predictable, increasing of AP3A levels in this cells and death of them through apoptosis.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



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**EFFECT OF PHOSPHORUS AND SULFUR SPRINGS ON ESSENTIAL OIL CONTENT IN BASIL
(*OCIMUM BASILICUM*)**

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In order to evaluate the effect of ammonium phosphate, sulfur, phosphoric acid sprayed and their interactions on basil essential oil content, this experiment in complete randomized blocks design, with three replications in Meshkinshahr town. The results of this study showed the amount of essential oil represented the significant difference at the level of 1% So much oil in the interaction of sulfur, ammonium phosphate, phosphoric acid, s₂a₃d₃ (15 and 1 and 5 per cent) rate 7/0 per cent respectively. Compared had high performance. Its lowest level s₁a₁d₂ (10 and 5/0 and 2/5 per cent) rate of 27/0 percent was observed consequently using of different percentages of fertilizers spraying by sulfur, ammonium phosphate, phosphoric acid, and their interaction effects was effects to increase basil oils [1-6].

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**EFFECT OF LOCALITY ON GERMINATION AND GROWTH
PIMPINELLA AUREA DC. SEED**

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The result of *Pimpinella aurea* project showed that the quantity and quality of essential oils of Inflorescence and seed are important [1] β-Bisabolene was the major compounds of essential oils that have the Anti-inflammatory character and used in medicinal industry and Cosmetic products – health [2]. In order to evaluate the effect of locality (Tochal, Vardavard and Lavasanat), on germination and growth of *P. aurea* seed, this study was performed the experiment design was factorial in the base of completely randomized design with four treatments in 2010. Measured characteristics were germination percent, MGT, R, SVI, Radicle length, Plumule length and 1000-grain weight.

The results showed that the effect of locality had significant differences on germination, MGT, R, 1000-grain weight, SVI and Plumule length on the level of 1%. Mean comparison showed that the most of germination (65.50%), the most of 1000-grain weight (1.900 gram) and SVI (16.28) were belonging to Lavasanat seed and the lowest of germination belonging to Tochal seed that had no significant differences with Vardavard seed. According to the results Lavasanat seed introduced to Cultivation

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF GIBBERELIC ACID, SALINITY, AND ASCORBATE ON THE GERMINATION AND SEEDLING GROWTH OF *CANNABIS SATIVA*

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This study was conducted to evaluate the effect of NaCl salinity, Gibberellic Acid (GA3) and Ascorbate on seed germination and seedling growth of *Cannabis sativa*. *Cannabis sativa* is an annual herbaceous plant in the [Cannabaceae](#) family. Each experiment was conducted as Factorial based CRD 3 replications and factors comprised: Salinity at 3 levels (75, 100, 150 mMol), GA3 at 1 level (0.05 mMol) and, Ascorbate at 1 level (0.2 mMol). The highest germination rate was observed after 18 days in T3S3 (salinity 150 mMol, GA3 and AS) at the first and T1 S3 (Salinity 75 mMol, GA3 and AS), at the second, while T3S1 (Salinity 150 mMol, GA3) caused the lowest germination.

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CAPPARIS SPINOSA RECH. F. BELONGS TO CAPPARIDACEA FAMILY

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Is one of the most perennial climber thorny aromatic shrub growing in wild in broad ranges of climatic conditions such as dry stepic in sea level to cold dry mountainous mediteranean region of Iran, which has been used long time ago as foods, cosmetics and drugs in traditional medicine for several purposes especially in treat of many current ailments. In this research in many fields observation most of traditional data about medicinal parts of plant and their activities were obtained by the rural leavers. So the flower bud and fruits were collected from KhoshYeylagh Mountains (2900m) in July 2011, then dried and extracted by methanol. Antibacterial activity of extracts was obtained by disc diffusion and well method against 9g positive and negative bacteria. Results showed that flowering bud and fruits of this plant have been used by the rural people of this region as single or combination with other medicinal herbs as a tonic, high nutritive ingredients like mineral and vitamins, anti inflammation, anti diabetes, diuretic, anti fungal, expectorant, anti bacterial, anti hypertensive, anti leishmania, anti hyperlipidemic, anti tole, analgesic, purgatives and liver tonic to treat of arteriosclerosis, hepatitis diabetes, rheumatic joints pain, arthritis, goat, blood pressure heart rate, toothache, cough and earch. Antibacterial screening showed that methanolic extracts of flower bud and fruits had stronger anti bacterial activities against tested bacteria (11-31mm) inhibition zone than other parts. In this research *staphylococcus aureus* and *S. epidermisis* with inhibition zone 31mm and 29 mm had the most sensinty especially to flower bud extract, whereas gram negative bacteria such as *shigella dysentria* and *Entroccus faecalis* with 11, 12 mm inhibition zone were the most resistant bacteria to bud and fruit extract. These data confirmed our results, which the fruit and flower buds of *C. spinosa* have a long history in traditional medicine of this region to treat of infection, bacterial disease and leishmunia.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EVOLUTION OF CYTOTOXIC ACTIVITY OF *MYRTUS COMMUNIS* FROM IRAN, SHIRAZ AREA

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Myrtus communis (commonly known as myrtle) belonging to the myrtaceae family is an evergreen shrub which has been grown abundantly throughout the borders of Mediterranean. This plant *Myrtus cummonis* has been widely grown around Shiraz. There is a lot reports about medicinal purpose of this plant. The most popular standard method for cyanotoxins has been the brine shrimp assay using the larvae of *Artemia salina*. This bio assay method is an in vivo lethality test in a tiny crustacean, the brine shrimp (*Artemia salina*). In this study the aerial part of plant extract considered and showed high potency of cytotoxic activity with an LC₅₀ value of about 75 ± 2 µg/ml.

INVESTIGATION OF DIFFERENT KINDS OF ORGANIC AND CHEMICAL FERTILIZERS ON VEGETATIVE CHARACTERISTICS AND SEED'S ESSENTIAL OIL OF *CORIANDRUM SATIVUM L.* UNDER DROUGH STERSS

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Coriander is one of the most important of vegetables, spice and medicinal plant. This crop has cultivated in ancient times in Iran. It is an annual and herbaceous plant, belonging to the Apiaceae family. It is primarily grown for grain and grain essential oil. Coriander seed oil is an aromatic stimulant, a carminative, an appetizer and a digestant stimulating the stomach and intestines. It is generally beneficial to the nervous system. Drought has been one of the major plagues affecting crop production causing famine and death. Despite many decades of research, drought continues to be a major challenge to agricultural scientists. In order to study the effects of drought stress and also four kinds of fertilizers on quantitative characters and seed essential oil amount in Coriander a field experiment in split plot design with four replications was carried out in 2011 at university of Torbat Heydarieh. Treatments included W₁ (with sufficient irrigation), W₂ (60% FC) and W₃ (30% FC) as main plot and three kinds of fertilizers: F₁ (N 25kg/ha), F₂ (chemical fertilizer), F₃ (manure fertilizer) and F₄ (vermicompost) as sub plot. Data were analyzed y using SAS.9 software. Results revealed that drought stress at W₃ treatment reduced dry grain yield around 41.74%. However the highest grain yield and vegetative characteristics were obtained in W₁ with applying chemical fertilizer treatments but at W₃ treatment, vermicompost fertilizer showed the best effect on coriander yield and grain composition. Water stress increased Essential oil percentage. The maximum amount was obtained in W₂ and using of chemical fertilizer.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



PRODUCTION OF *MURINE LEUKEMIA VIRUS* VIRAL VECTOR FOR EVALUATION OF ANTI RETROVIRAL IRANIAN MEDICAL PLANTS

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The *Murine Leukemia Virus* (MLV) is most prominent member of *orthoretrovirinae* genus of gammaretroviruses. According to its genome organization MLV belongs to the simple retroviruses, harboring only open reading frames for the structural proteins Gag and Env and Pol [1]. Retroviruses are one of the most important pathogens that cause a variety of diseases in humans and animals [1]. In this project, we have Produced replication-incompetent MLV viral vector or pseudo type virus by transient co transfecting the HEK293T cells with the three vector plasmids include a possible gag-pol plasmid (pCLECO), an envelope plasmid(VSVG) and the expression vector plasmid (pBABE-GFP). Co-transfection of three plasmids and construction of pseudo typed MLV were done using calcium phosphate method. One of the applications viral vectors is evaluation of anti-retroviral property of medicinal plants. Medicinal plants, because of their often multiple targets, minor side-effects, low potentials to cause resistance and low costs, are increasingly being projected as suitable alternative sources of antiviral agents [2-6]. We used of MLV viral vector for testing antiretroviral activity of different Iranian medical plants. On the other hand, an MLV-based system serves as an ideal model for HIV-1 to evaluate whether anti HIV medical plants selectively targets a lentiviral protein or a common component [7].

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BERBERIS VULGARIS A NEW ADDITIVES TO BROILER RATION

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Barberry is native to subtropical and temperate regions of Europe, Asia, Africa, North America, and South America. Most major producing in the world with nearly 97 percent. Studies carried out on the chemical composition of the plant show that the most important constituents of this plant are isoquinoline alkaloids such as berberine, berbamine and palmatine. Berberine is the main active constituent and the most studied alkaloid. berberine has a lot of beneficial health effect such as antimicrobial (killing bacteria and parasites), anti-inflammatory, antinociceptive, antihistaminic, hypoglycemic, hypolipidemic, hypotensive (causing a lowering of blood pressure), protect liver, sedative, and anticonvulsant effects. It may also stimulate the immune system. Berberine should have potential for developing a new drug to treat drug/chemical-induced liver toxicity. In an experiment on broilers from use of barberry on serum cholesterol, triglycerides, high-density lipoproteins (HDL), low-density lipoproteins (LDL), was investigated and found that lowering cholesterol levels and barberry increased up to 2% reduction in triglycerides and LDL and HDL increased [6]. Berberin is a new cholesterol-lowering drug that treatment of hyperlipidemic hamster with BBR reduced cholesterol by 40% and LDL cholesterol by 42%. Berberine activates AMPK activity in both adipocytes and myocytes, and within these cells type's berberine induces a variety of metabolic effects consistent with AMPK activation. Moreover Berberine has antidiabetic properties. It probably act as a α -glucosidase inhibitor, which is it the main mechanism in diabetes treatment. The inhibitory effect of berberine on diabetes also might be associated with its hypoglycemic effect. Berbamine (BM) is an herbal compound derived from *Berberis vulgaris* L commonly used in traditional Chinese medicine. In this study, we show that BM has potent anti-inflammatory properties through novel regulatory mechanisms, leading to reduced encephalitogenic T cell responses and amelioration of experimental autoimmune encephalomyelitis (EAE).



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECTS OF DIFFERENT TEMPERATURES ON GERMINATION OF 5 ECOTYPES OF SYRIAN BEAN-CAPER (*ZYGOPHYLLUM FABAGO*)

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Zygophyllum fabago L. a member of the Zygophyllaceae family, is a herbaceous plant found widely in the Mediterranean area [1]. It distributed in most area of Iran. *Zygophyllum fabago* voucher no. MAZ 1547 is used as a part of a drug for rheumatism and gout. It is also used externally as poultice to cure skin diseases, external wounds, septic and injuries[2].

In order to study the response of different ecotypes of Syrian bean-caper seed germination, to different temperatures experiment was conducted using factorial based on Completely Randomized Design with two factors in 3 replicates of 50 seeds under controlled conditions of germinator. The treatments were in five levels (15, 20, 25, 27 and 30°C) and five ecotypes (Mobarakeh, flavarjan, baghbahadoran, chadegan and Shahreza). This study conducted in Esfahan Agricultural and Natural Resource Research Center. Characteristics such as percentage of seed germination, rate of seed germination and the time of reaching 50% seed germination were recorded. Results showed that there was significant difference between ecotypes ($p < 0.01$) in percentage of seed germination. Flavarjan ecotype had the highest and Shahreza had the lowest percentage of seed germination. However, the highest percentage of seed germination was obtained in 25 °C. The highest rate of seed germination was in 30 °C and there wasn't any difference between ecotypes.

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ANTIBACTERIAL EFFECT OF METHANOL LEAF EXTRACT OF POMEGRANATE (*PUNICA GRANATUM*), AND THE INHIBITORY EFFECT OF ITS COMPONENTS AGAINST *ERWINIA AMYLOVORA*

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Fire blight is a destructive bacterial disease of pears and apples in the world that kill blossoms, shoots, and limbs. The disease control mainly relies on the application of the antibiotic, streptomycin. But, according to the occurrence of resistance to the antibiotic, alternative safe methods are needed for disease control. Plant extracts are alternative source of natural pesticide to control plant diseases. Therefore, in this study, crude methanol extracts of 70 plant species collected from the west of Iran were screened for antibacterial activity against *Erwinia amylovora*. Bioassay of extract was conducted by paper disc diffusion method (5 mg per paper disc). The results indicated that crude extract of pomegranate (*Punica granatum*) has remarkable antibacterial activity against *Erwinia amylovora* with 23 ± 0.4 mm diameter of inhibition zone. To determine the most effective component, crude methanol extract of pomegranate was fractionated by thin layer chromatography (TLC). Crude extract was fractionated to eight bands under UV light at a wavelength of 360 nm. Different bands were recovered from silica gel and tested against bacteria after quantification. Based on the results, the first band (brown band) with $R_F=0.00$ was found to possess inhibitory activity. It could be concluded that pomegranate crude extract has a significant antibacterial properties and therefore more research needs to be done in this field.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF BLACK SEED (*NIGELLA SATIVA*) ON PERFORMANCE, HUMERAL IMMUNITY AND BLOOD PARAMETERS, JEJUNAL EPITHELIUM MORPHOLOGY OF BROILER CHICKS

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This experiment was conducted to investigate of the effect of black seed (*Nigella sativa*) on performance, blood parameters and **jejunal epithelium morphology of broiler** chicks on completely randomized design total 240 day-old broiler chicks were used and randomly allotted equally into six experimental groups designated with five replications and 10 chicks in each replication added. The nutrient requirements of chickens were adjusted according to the recommended diet of Ross-308 Company. Dietary treatments included a control basal diet (without adding black seed), basal diet + 0.5% black seed, basal diet + 1% black seed, basal diet + 1.5% black seed, the basal diet + 2% black seed. Feed intake, weight gain, feed conversion and mortality were measured weekly during the experiment. Blood samples were taken on 21 and 42 days and the amount of albumin, total protein, triglyceride, cholesterol, HDL, LDL, bilirubin, enzymes (ALT and ALP), glucose and uric acid were measured. To evaluate the immune system after injection of 0.5% SRBC at 7 and 14 days, blood samples were taken on days 21 and 28 days. To investigate the effect of treatments on carcass components and morphology of jejunum, slaughter and carcass analysis was performed on days 21 and 42 days, and the results were statistically analyzed. The results were showed that the conversion ratio between 0 to 21 days, weight gain in the first five weeks of the experiment, consumption of 8 to 21 days were significant ($P < 0.05$). In 21 days, the effect of treatments on levels of bilirubin, cholesterol and triglycerides was significant respectively. In 42 days, the effects of treatments on HDL and bilirubin levels were significant. Live weight and carcass weight at 21 days was a significant between different treatments. Variables measured in the jejunum including lint length, lint width, crypts depth, lint area, lint density and area of absorption region were significant. The values of IgM and IgG at 21 and 28 days increased but the change was not statistically significant.

The overall result is influenced that 2 percent black seed (*Nigella sativa*) on performance, blood parameters and **jejunal epithelium morphology of broiler** chicks.

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THE STUDY OF THE ADAPTATION, YIELD AND QUALITY OF THE DIFFERENT VARIETY OF ANISE (*PIMPINELLA ANISUM* L.) UNDER EFFICIENT AND MARGINAL LANDS IN ÇUKUROVA AREA (TURKEY)

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In order to study adaptation, yield and quality of the essential oil of various Anise (*Pimpinella anisum* L.), an experiment was conducted under various land conditions on both efficient and marginal lands of Çukurova area in Turkey by providing seventeen different variety and population of the Anise from both inside and outside of Turkey. The experiment was conducted with completely randomized block design and three replication in researching field of Field Crops Dept. Of Çukurova University. According to the experiment results, in the first year, under efficient land conditions the highest yield grain achieved by variety no. 8 (1128kg/ha) and in the second, it was variety 7 (14.58 kg/ ha). In the first year and under the marginal lands conditions, variety no. 11 (1053 kg/ ha) had the highest yield grain and in the second year, the variety no. 7 had the highest yield grain. Therefore, the variety no. 7 (17/84 – Germany) in both years and also under both conditions, had the highest yield grain. By studying the quantity of the essential oil in each of those two years and under efficient Lands conditions, the highest grain yields belonged to variety no. 17 (In the first year, it was %2.50 and in the second it was %2.31). Also, the variety no. 17 had the highest grain yields (%2.47) in the 2nd year of experiment under marginal lands conditions. In the first year and under the marginal land conditions the varieties no. 3 and 6 jointly had the most quantity of the essential oil production output (%2.14). In the experiments mentioned above, the essential oil compounds of the varieties analyzed in both cultivating conditions and in those two years.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECTS OF DIFFERENT TEMPERATURES ON GERMINATION OF 5 ECOTYPES OF SYRIAN BEAN-CAPER (*ZYGOPHYLLUM FABAGO*)

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Zygophyllum fabago L. a member of the Zygophyllaceae family is a herbaceous plant found widely in the Mediterranean area [1]. It distributed in most area of Iran. *Zygophyllum fabago* voucher no. MAZ 1547 is used as a part of a drug for rheumatism and gout. It is also used externally as poultice to cure skin diseases, external wounds, septic and injuries [2]

In order to study the response of different ecotypes of Syrian bean-caper seed germination, to different temperatures experiment was conducted using factorial based on Completely Randomized Design with two factors in 3 replicates of 50 seeds under controlled conditions of germinator. The treatments were in five levels (15, 20, 25, 27 and 30°C) and five ecotypes (Mobarakeh, flavarjan, baghbahadoran, chadegan and Shahreza). This study conducted in Esfahan Agricultural and Natural Resource Research Center. Characteristics such as percentage of seed germination, rate of seed germination and the time of reaching 50% seed germination were recorded. Results showed that there was significant difference between ecotypes ($p < 0.01$) in percentage of seed germination. Flavarjan ecotype had the highest and Shahreza had the lowest percentage of seed germination. However, the highest percentage of seed germination was obtained in 25 °C. The highest rate of seed germination was in 30 °C an there wasn't any difference between ecotypes.

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EVALUATION OF CYTOTOXIC AND ANTIMICROBIAL ACTIVITY OF THE LEAVES AND FRUITS OF *FERULA OVINA* BOISS FROM KASHAN AREA

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Genus of *Ferula* which belongs to tribe Peucedaneae, subfamily of Apioideae, Umbelliferae family has 133 species distributed throughout Mediterranean area and central Asia [1-3]. The chemistry of this genus has been studied by many investigators. More than 70 species of *Ferula* have already been investigated chemically [4] The Iranian flora comprises 30 species of *Ferula*, of which some are endemic [2,5]. The popular Persian name of the most of these species is "Koma"[5]. *Ferula ovina* (Boiss.) Boiss. is one of these species which is distributed in different regions of Iran [2]. Anti-spasmodic, anticholinergic and smooth muscle relaxant activities of the aqueous extracts of *F. ovina* have previously been reported [6,7] In this paper we research about in vitro Cytotoxic and anti microbial potentials of the leaves and fruits of *Ferula ovina* Boiss. The methanol extracts from the leaves and fruits showed a high potency of cytotoxic activity with an LC50 value of about 19 ± 2 and 10 ± 2 $\mu\text{g/ml}$. More over the extracts of the plant showed a low antimicrobial activity against two strains of tested microorganisms.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



A STUDY ON EFFECT OF ETHANOLIC AND AQUEOUS EXTRACTS OF *ROSA DAMASCENE* PETALS AND *SEDUM ALBUM* ON PROLIFERATION OF THE HUMAN BREAST CANCER CELL IN VITRO

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Breast cancer is a malignant tumor that starts from cells of the breast. The disease occurs almost entirely in women, but men can get it, too. Excluding cancers of the skin, breast cancer is the most common cancer among women, accounting for one out of every three cancer diagnoses. Iran has unique plant varieties yet to be studied for anticancer components. The aim of the present study was to investigate the anticancer activity of ethanolic and aqueous extract of *Rosa damascene* petals (RD) and *sedum album* (SA) on breast cancer cells. Materials and methods: Ethanolic and aqueous extracts of RD (ERD, ARD) and SA (ESA, ASA) were prepared. The antitumor activity of RD and SA were surveyed eight different concentrations and 5-fluorouracil drug on MCF (breast cancer) and HSkMC (fibroblast) as control. MTT assay was used for toxicity, 5-Bromo-2'-deoxyuridine (BrdU) assay for cell proliferation and TUNEL test was used for measuring apoptotic cell death.

ERD, ARD, ESA and ASA showed cytotoxic activity towards breast cancer cell line with an IC(50) 1626.22 μ g/ml, 2631.83 μ g/ml, 5549.06 μ g/ml and 5226.76 μ g/ml and reading optic density (OD) at The highest concentration was 0.6148nm, 0.4480nm, 0.3180 nm and 0.4375nm, respectively. Conclusion: These data indicate that ethanolic and aqueous extracts of *Rosa damascene* petals and *sedum album* have cytotoxic, anti-proliferative and pro-apoptotic activities on breast cancer. Further research in this field using animal models would help to explore and interpret the potential properties of RD and SA as an anticancer supplement.

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STUDY OF VEGETATIVE MORPHOLOGICAL ATTRIBUTES IN SOME SAFFRON (*CROCUS SATIVUS*) LAND RACES FROM KHORASN

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Iran is one of rich centers of saffron germplasm in the world. Moreover, The populations belonged to one species which has been grown in different ecological conditions usually varies genetically. The high level of genetic diversity led to increasing selection chance of the proper genotypes for plant domestication and breeding. Few studies have been carried out on morphological diversity of different saffron populations, so far. Therefore, this research has been run regarding to evaluating vegetative morphological diversity among 65 different saffron (*Crocus sativus*) land races, which are collected up from Razavi and Southern Khorasan. Results of anova showed that all studied traits had significant difference among the land races. The mean comparisons of the attributes displayed that the land races such as 109 (Torbat Heydariyeh, Kaj village), 307 (Gonabad, Noghab vil.) and 401 (Feizabad, Doughabad vil.) had highest means for leaf number, leaf length, dry and fresh weight of leaves. The land races of 3 (Ghaen, Kareh vil.), 502 and 501 (Ferdows, Afghoo Vil.) had the lowest means for above traits. Nevertheless, there was different trend among the landraces for leaf area, as 28 and 502 (Ferdows, Afghoo vil.) had the lowest and the highest values, respectively. Totally, the results of this research represented considerable variation among Khorasan saffron landraces. Nevertheless clonal reproduction of saffron, it seems that various climatic and ecological in the area under cultivation during long times probably led to creation adaptive ecotypes to the areas.



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16, 17 May 2012
Kish Island



EVALUATION OF SOME SAFFRON (*CROCUS SATIVUS*) LAND RACES FROM KHORASN USING REPRODUCTIVE MORPHOLOGICAL TRAITS

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Iran is considered as one of the major centers of plant species variation including medicinal herb saffron. However, the medicinal species have been prone to extinction in recent years. Therefore, it is essential to make conservation and collection of the species by different ways e.g. to establish gene bank and evaluating the populations in order to identify the medicinal valuable genotypes. Few researches have been carried out on morphological diversity of saffron land races. Hence, this study has been done in sep. 2011 regarding to investigating variation of reproductive morphological traits among 46 different saffron (*Crocus sativus*) land races, which are collected up from Razavi and Southern Khorasan. The extracted results by ANOVA test showed significant variation among the land races for the studied attributes. The mean comparisons stated that the land race of 404 (Feizabad, dooghabad vil.) and the land races of 205 (Bajestan, chaharbagh vil.) and 601 (Ghaen) had the largest and the lowest means for petal length and peduncle diameter, respectively. The highest means for Then, it is easy to say there is a significant variation among saffron land races from Khorasan for flower morphological traits, as selection of superior clones may be hopeful.

PHYSIOLOGICAL RESPONSE OF SWEET BASIL (*OCIMUM BASILICUM* L.) SEEDLINGS TO ARSENATE TOXICITY

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Arsenic (As) is the most toxic metalloid widely concerned and present in the atmosphere as well as in the aquatic and terrestrial environment [1, 2]. If such medicinal plants naturally grown or cultivated in metal contaminated regions, there is a danger that the heavy metal accumulation by plants of medicinal value may cause serious health hazards to patients using metal adulterated herbal drugs [3]. This investigation was carried out to investigate the effect of arsenic on some physiological and morphological parameters of Sweet Basil (*Ocimum basilicum* L.). Plants remained in a controlled environment for six weeks in nutrient solutions. Twenty five day old seedling were subjected to different concentration of As at 0 (Control), 150 and 300 μM in the form of Na_2HAsO_4 (Arsenate). A marked decrease in relative water content (RWC), anthocyanins content, shoot, and root elongation as well as plant biomass was observed with arsenic treatments, as compared to control, whereas malondialdehyde (MDA) in seedlings was increased significantly with increasing arsenic, especially at concentration 300 μM . The results indicated that Arsenic could exert harmfulness in the growth of sweet basil at inappropriate concentration.

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INSECTICIDAL EFFECTS OF TWO PLANTS EXTRACTS ON *TRIBOLIUM CONFUSUM* (COL., TENEBRIONIDAE) AND *BRUCHUS LENTIS* (COLEOPTERA: BRUCHIDAE)

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Confused flour beetle, *Tribolium confusum* Duval (Col., Tenebrionidae), and lentil weevil, *Bruchus lentis* Frölich (Col., Bruchidae), are two important pests of stored flour and legumes and make noticeable damage to stored products every year [1]. On the other hand, with respect to high damage of stored product pests and unfavorable effects of chemical pesticides, research for access to safe compounds to control is unavoidable [2,3]. Therefore, during this research, insecticidal effects of two plant extracts of Bay Laurel (*Laurus nobilis* L.) and Blue Mint Bush (*Ziziphora clinopodioides* Lam) in contact with two important pests of stored products including *T. confusum* and *B. lentis* were investigated. The experiments were conducted using a completely randomized design. All Experiments were carried out at 28±2°C, 55±5% R.H and under dark condition. The insecticidal effects of different concentration (100, 500, 1000, 5000, 10000, 20000, 50000 and 100000 PPM) of both plants extracts were determined in contact with adults of confused flour beetle and lentil weevil using paper disk method. Overall, obtained results showed that greatest mortalities were occurred in the highest concentration and after 72 hours. In the highest concentration of *L. nobilis* and *Z. clinopodioides*, 35.01±2.04 and 51.11±2.22% mortalities were observed in population of *T. confusum* and 98.75±1.25 and 93.33±2.72% for *B. lentis*, respectively. The comparison between relative potency of *L. nobilis* and *Z. clinopodioides* revealed that extract of *Z. clinopodioides* was 1.86 times more toxic than *L. nobilis* on *T. confusum* after 72 hours. On the contrary, *L. nobilis* after 24, 48 and 72 hours caused 3.12, 7.69 and 16.67 times more mortalities on population of *B. lentis* than *Z. clinopodioides*, respectively. In comparison between two pests, *L. nobilis* and *Z. clinopodioides* were 755.85 and 6.25 times more fatal on *B. lentis* than *T. confusum* after 72 hours, respectively. The results show that extracts of *L. nobilis* and *Z. clinopodioides* could be considered as suitable choices for management of *B. lentis*, while, no satisfying impacts were obtained for *T. confusum*.

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MODULATION OF ARSENIC TOXICITY-INDUCED OXIDATIVE DAMAGE BY EXOGENOUS NITRIC OXIDE SUPPLY IN *OCIMUM BASILICUM* (SWEET BASIL)

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Nitric oxide (NO) is a highly reactive free radical with a wide variety of physiological and pathological implications in plants (Cui et al., 2010). Arsenic (As), a non-essential element for plants and animals, occurs naturally in the environment through geological activities causes a major environmental and human health risk (Chun-xi et al., 2007). On the other hand, Sodium Nitroprusside (SNP), a NO donor, is known to have effect on heavy metal-induced oxidative stress in plants (Singh et al., 2008). Here we investigated the protective effect of exogenous SNP against the toxicity caused by excess arsenic in sweet basil (*Ocimum basilicum* L.). Seedlings grown in a Hoagland nutrient solution were treated with SNP at 0 (Control) and 150 µM and different concentration of As(V) at 0 (Control), 150 and 300 µM. Arsenic treatment induced significantly accumulation of reactive oxygen species (ROS) such as hydrogen peroxide (H₂O₂) and led to serious lipid peroxidation and decrease the growth and biomass accumulation in basil leaves, especially at concentration 300 µM. Application of SNP before arsenic stress resulted in alleviated arsenic-induced electrolyte leakage, prolin content and malondialdehyde (MDA) content in sweet basil, Compared with control. The study concludes that exogenous nitric oxide has an ameliorating effect against As-induced oxidative stress in sweet basil and protects this plant against injuries caused by arsenic.

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16, 17 May 2012
Kish Island



CORONATINE PRETREATMENT ALLEVIATES OXIDATIVE STRESS INDUCED BY ARSENIC IN
OCIMUM BASILICUM L.

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Heavy metals contribute a variety of toxic effects on living organisms in food chain by accumulation and biomagnifications (Shri et al., 2009). Coronatine (COR), a chlorosis-inducing phytotoxin, recognized as a new class of plant growth regulator which mimics the biological activities of methyl jasmonate (JA) in plants (Xie et al., 2008). It is more biologically active even 100-1000 times than JA (Wang et al., 2009). With the aim to determine if Coronatine alleviates arsenic (As) toxicity on Sweet basil, plants remained in a controlled environment for 6 weeks in nutrient solutions. COR was applied to seedling at two-leaf stage at 0 (Control), 50 and 100 nM and twenty day old seedling were subjected to different concentration of AS at 0 (Control), 150 and 300 μ M. Arsenic treatment decreased the growth, Leaf area, biomass accumulation and chlorophyll content, increased lipid peroxidation and hydrogen peroxide content, especially at concentration 300 μ M. Seedling treated with COR showed significant higher tolerance to As toxicity. Compared with control, growth and biomass accumulation of seedling treated with COR was increased. Content of some phenolic compounds such as flavonoids and anthocyanins was enhanced by COR pretreatment in arsenic treated plants. The results suggest that COR enhanced heavy metal tolerance in Sweet basil by improving antioxidant defense system.

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THE EFFECTS OF LEAD (Pb(NO₃)₂) AND CADMIUM (CdCl₂) ON
ESSENTIAL OIL COMPOUND OF *MENTHA AQUATICA* L.

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The use of aromatic medicinal herbs to relieve and treat many human diseases has been increased in around the world. It is important to have a good quality control for aromatic medicinal herbs in order to protect consumers from contamination [1]. Environmental pollution is a major concern in the world. Heavy metal can accumulate in soil and plant and cause the highest environmental stress [2]. Medicinal herbs can be easily contaminated with heavy metals from the environment (soil, water, or air) during growth and the manufacturing processes when the ready-made products are produced [3]. *Mentha aquatica* L., (water mint) grows wild on wet ground, near rivers, in north of Iran [4]. The leaves essential oils of the control and treated plants under Pb(NO₃)₂ and CdCl₂ stress were obtained by Clevenger-type apparatus [5], and its components was analyzed by means of gas chromatography-mass spectrometry (GC-MS). The aim of this study was to detect the component of essential oil of *Mentha aquatica* L. under Pb and Cd stress. The major components of control and treated oil were similar. The main components were trans-Caryophyllene, Germacrene-D, δ -Cadinene, alpha-Pinene, 1,8-Cineole, τ -Terpinen, Menthofuran, β -Cubebene, β -Pinene and Phytol. The tested treatment slightly altered chemical composition of the essential oil. We showed a reduction in the α -Humulene (4.25%), α -Cadinol (1.05%), Caryophyllene oxide (0.76%), Camphene (0.44%), Decane (3.16%), Acetic acid (0.07%), 1,7,7-Trimethyl (0.07%), Ethion (0.59%) in Cd treated oil and a reduction in the α -Humulene (0.06%), Veridiflorol (0.13%), α -Cadinol (0.84%), Caryophyllene oxide (0.93%), Decane (0.32%), 1,7,7-Trimethyl (0.07%), Ethion (0.38%) in Pb treated oil. In conclusion base on our study and Valtcho D. Zheljzakov records [6] water mints can be grown in soils enriched with Pb and Cd without significant alternation of essential oil composition.

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EFFECT OF PH AND TIME OF PASTEURIZATION ON SOME BIOACTIVE COMPONENTS OF *ALOE VERA* GEL

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Aloe barbadensis Miller or simply *Aloe vera* belongs to the lily family and believed to have originated in Africa and then transplanted to the far East and Western hemispheres [1], is the most widely used and commercially available aloe because of its curative and therapeutic properties and having over 75 bioactive component especially phenol compounds, vitamins, bioactive polysaccharide, namely acemannan and etc. from the inner gel [2-6]. Therefore, *Aloe vera* gel has been utilized as a resource of functional food, especially in health food drinks, as a resource of medicine and also in the cosmetic and toiletry industries [6]. Many of the medicinal effects of gel have been attributed to a synergistic action of the compounds contained therein especially acemannan [4]. High temperature and change in pH usually destroy bioactive components [1], so in this research, effects of changes in pH and time of pasteurization were investigated. First *aloe vera* gel was handily extracted and then samples were adjusted in three pH including 3, 3.5 and 4 with citric acid addition to ensure effective pasteurization and achieve better flavor [7]. Provided samples were poured in glass test tubes and pasteurized at 90 °C in three times included 1, 1.5 and 2 minutes. Microbiological tests such as enumeration of yeast and mold, lactic acid bacteria and acid resistant bacteria were used to prove the adequacy of pasteurization. Results showed that all treatments pasteurized samples. After that, some bioactive components such as vitamin C content, total phenol content, antioxidant activity, glucomannan content, brownin index (BI) and chroma were measured to determine best treatment among them [1,5,8]. Result showed that although there were not significant differences between 9 treatments in vitamin C content (46.8 ± 2.3 mg vitamin C /100 g d.m.), total phenol content (4200 ± 140 mg Galic Acid/100 g d.m.), glucomannan content ($2.36 \pm .15$ g/l), browning index (BI) (7.6 ± 0.3) and chroma (5.37 ± 0.10) (p-value < 0.05) but there were significant differences between raw and treated samples. Antioxidant activity of samples was decreased with increasing time of pasteurization (from $22.29 \pm 1.3\%$ in 1 min treatment to $18.18 \pm 1.3\%$ in 2 min. treatment and also there were significant increase (p-value < 0.05) in antioxidant activity from pH=4 to pH=3, 3.5, therefore, pasteurization at 90 °C for 1 min with pH=3.5 is the best treatment that has the lowest effect on bioactive components and has good flavor.

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EFFECT OF ARBUSCULAR MYCORRHIZA ON PHENOLIC COMPOUND PRODUCTION IN MINT

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Between 4000-6000 antioxidant compounds which are mainly phenolics, are synthesized through plants secondary metabolism. They serve in plant defense mechanisms via counteracting ROS [1]. In this study, total phenolics in three populations (Meybod, Kashan and Bojnourd) of mint (*Mentha spicata*) were measured, after inoculation by either of two species of arbuscular mycorrhiza; *Glomus mosseae*, and *G. etunicatum*. The plant species is an important traditional flavor, fragrance, and medicine, and it was speculated that plant symbiosis with arbuscular mycorrhiza would alter its chemical and biological factors[2,3]. Young stem cuttings of *M. spicata* were planted in sterilized soil containing 20 g AMF inoculum of each species. Root phenolics were extracted using 80% methanol. Total phenolic compounds were then measured using Folin-Ciocalteu assay and expressed as gallic acid equivalent. Results showed that vegetative development in terms of number of leaves, stem height and fresh and dry matter of the aerial part was enhanced when both AMFs were used as inoculum. Total phenolic content was significantly increased by mycorrhizal symbiosis with the most change related to inoculation with *G. mosseae*.

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NITROGENOUS FERTILIZER INFLUENCE ON THE GROWTH CHARACTERISTICS OF
CALENDULA OFFICINALIS

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Use of nitrogen to control crop growth and productivity has been one of the key contributing factors for the incremental improvement, not only in agricultural but also in medicinal crop production [Shah and Samiullah, 2007]. In order to investigate the effect of different levels of nitrogen fertilizer on growth characteristics of *calendula officinalis* L., an experiment was conducted in research station in semnan. *Calendula officinalis* L. (Asteraceae) is an annual, aromatic, medicinal and ornamental herb with yellow and orange flowers, a native to Mediterranean region [Gazim et al., 2008]. The composite flowers blossom in the spring-summer seasons three times per year [Gomes et al., 2007]. The leaves and flowers of marigold are applied in horticulture, medicine, cosmetics, perfume, pharmaceutical preparation, food and other industries [Gazim et al., 2008]. The research carried out with 4 levels of nitrogen, using of completely randomized block design with three replications. The treatments included (0, 100, 200, 400) kg/ha nitrogen and applied in 3 stages on plant. Results showed that effect of different levels of nitrogen application on height and diameter of plant was not significant, but on the flower, leaf and stem dry weight was significant. The highest flower, leaf and stem dry weight was obtained from level of 100, 200 and 400 kg/ha nitrogen. But the level of 100 kg/ha showed better performance on yield, with the least of agroecosystem pollution.

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EFFECT OF DENSITY ON YIELD AND YIELD COMPONENTS OF THYMUS SPECIES (*T. VULGARIS*, *T. KOTSCHYANUS*, *T. ERIOCALYX*) IN DRY LAND CONDITION

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Due to investigating the effect of density on yield and yield components of *Thymus* species in dry land condition of Kermanshah, a split plot design under complete randomized block design with three replications in 2009 – 2010. Main plots included thyme species in 2 levels (*T. vulgaris*, *T. kotschyanus*, *T. eriocalyx*) sub plots were included plant density in 3 levels (4, 6, 8 plants /m²). Characteristics which measured were Plant height, canopy diameter, number of flowering shoots, fresh weight per plant, dry weight per plant, yield. The results showed that effect of species and density were significant. But the interaction was not significant. High density (8 plants /m²) produced the most yield and essential oil yield. Result of comparison the species mean showed that *T. vulgaris* had the maximum height, canopy diameter, number of flowering shoots, fresh weight and yield in the dry conditions. So, according to the results, height, canopy diameter and yield, *T. vulgaris* could be introduced as a suitable species in dry conditions.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EVALUATION OF QUANTITATIVE INDICES OF ESSENTIAL OIL OF DILL (*ANETHUM GRAVEOLENS*) INFLUENCED BY DIFFERENT STRIP INTERCROPPING PATTERNS WITH BEAN (*PHASEOLUS VOLGARIS*)

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In order to study the effect of nitrogen fixation by bean on quantitative indices of essential oil of dill, an experiment was conducted in 1388 at Tabriz Agricultural Research Station. This experiment was applied in randomized complete block design with three replications and 8 treatments. Treatments consist of strip intercropping patterns, include six ratios (2: 2), (2: 4), (4: 2), (4: 6), (6: 4) and (4: 4) bean and dill respectively and two treatments of pure cultures of both species. Results showed that the effects of strip intercropping patterns were statistically significant on seed yield, essential oil percentage, essential oil yield and essential oil harvest index of dill. The highest seed yield of dill (502.7 kg.ha⁻¹) was produced of (2: 2) cropping pattern. The highest percentage of essential oil (3.303 percent) and highest essential oil yield (14.28 kg.ha⁻¹) of (4: 6) strip intercropping pattern were obtained, and the highest essential oil harvest index (1.182%) of pure culture was produced that didn't have significant difference with (4: 6) strip intercropping pattern. The lowest seed yield (334 kg.ha⁻¹), percentage of essential oil (2.66%), oil yield (8.78 kg.ha⁻¹) and oil harvest index (0.883%) resulted in (4: 2) strip intercropping pattern. These results indicate the advantages of intercropping patterns and its positive effects on quantitative indices of dill essential oil.

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ANTHER CULTURE OF *SATUREJA KHUZISTANICA* AND *SATUREJA RECHINGERI*: THE EFFECT OF CARBOHYDRATE SOURCE AND HORMONAL TREATMENTS

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The genus *Satureja* (Lamiaceae) is represented in Iran by twelve species of which nine as *S. khuzistanica* Jamzad and *S. rechingeri* Jamzad are endemic. Both species are medicinally valuable for their essential oils which are rich for antioxidant compounds such as Carvacrol. The objective of the present study was to explore an efficient technique on homozygous plants production in a breeding program for medicinal and food industries. Anther culture is a convenient technique to obtain androgenic haploid and doubled haploid plants. Doubled haploid plants are 100% homozygous and most efficient for production of Hybrid variety. In this work, we studied the effect of two types of carbohydrate (maltose, sucrose) and four hormonal treatments (A: 0.5 mg/l BA, 0.5 mg/l 2,4-D, 0.5 mg/l Kin, B: 1 mg/l BA, 0.5 mg/l 2, 4-D, 0.36 mg/l Kin, C: 1 mg/l BA, 1 mg/l 2, 4-D, 0 mg/l Kin D: control) on the frequency of induction and growth of callus through anther culture in both species. The media employed for induction of calli was N6 with 1.5 % of each carbohydrate. Experimental was performed in factorial, based on CRD design with three replications. Each replication consisted of 12 anthers. Firstly, the developmental stage of microspore was identified and then flower buds were collected in the right developmental stage. Results showed that in control treatment callus was not induced. The effect of species, carbohydrate and hormonal treatments on callus induction was significant (P<0.05). The higher percentage of callus induction was obtained in *S. rechingeri* (22.2%), N6 media containing maltose (21.9%) and A hormonal treatment (26.39%). Interaction between species and hormones was significant with 28.24% in *S. khuzistanica* and A hormonal treatment. Interaction between carbohydrate and hormonal treatment was significant and producing callus in the highest percentage was related to maltose with B hormonal treatment.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF DIFFERENT STRIP INTERCROPPING PATTERNS ON YIELD AND COMPETITION INDICES OF BEAN (*PHASEOLUS VULGARIS*) AND DILL (*ANETHUM GRAVEOLENS*)

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In order to study the possibility of intercropping dill with bean, an experiment was carried out in 1388 at Tabriz Agricultural Research Station. This experiment was applied in randomized complete block design with three replications and 9 treatments. Treatments consist of a row intercropping, strip intercropping pattern includes six ratios (2: 2), (2: 4), (4: 2), (4: 6), (6: 4) and (4: 4) dill and bean respectively and two treatments of sole cultures of both species. The results showed that the effect of different planting patterns was significant on grain and biological yield in both species. Based on the results, The highest seed yield of bean (1261kg.ha⁻¹) and the highest seed yield of dill (502.7 kg.ha⁻¹) were produced of sole cropping pattern of bean and strip intercropping (2: 2) of dill and bean respectively. Partial LER and RCC for dill was higher than bean in all treatments. The amount of (LER) and relative value total (RVT) was higher than one in all intercropping patterns. The results of aggressivity (A) showed that dill was dominant species with positive values in the intercropping pattern systems. Evaluation of intercropping indices of beans and dill, LER, RCC, A and RVT, showed the advantages of intercropping bean and dill to sole cropping systems.

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IDENTIFICATION OF ESSENTIAL OIL COMPOSITION FROM *STACHYS BYZANTHINA C. KOCH* COLLECTED IN SAVAD- KOOH

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Medicinal and essential oils bearing plants from Labiatae because of the high ecological flexibility related to diverse climates are considering as one of the most important plant genetic resources. In many countries several plants of this family has been used as spices and as medicinal plants to treat microbial diseases or digestion problems for centuries. This family has 46 genus and 410 species and subspecies in Iran. *Stachys byzanthina c. Koch*. is a member of this family which in the academic resources has pointed to the anti-bacterial, anti-inflammatory, antioxidant, and also insecticide properties of it. Samples were collected by randomly method in complete flowering stage of this plant from flowering shoots in late June 2011 from natural habitat in Savad- kooH, Mazandaran, dried in shade and open air and the oil obtained by Hydrodistillation procedure with Clevenger and analysis is done by means of gas chromatograph (GC) and gas chromatograph connected to a mass spectrometer (GC / MS) apparatuses. The results of this assay were shown that the average yield of essential oil of this plant in the dry plant shoot according to oil weight at 100 g is 0.24 percent. There are 28 components (97.02%) in the essential oil of this plant that the major components respectively are Bis (2-ethylhexyl) phthalate (18.35%), (E)- β -farnesene (15.03%), *p*-Cymene (12.07%), 1-(1,5-dimethyl-4-hexenyl)-4-methyl- Benzene (10.97%), Germacrene-D (8.34%), Levomenol (7.16%), 6,10,14-Trimethyl-2-pentadecanone (4.98%), *cis*- γ -Bisabolene (3.02%), β -Elemene (3%).



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16, 17 May 2012
Kish Island



EFFECTS OF NA₂CO₃ AND SUPPLEMENTARY POTASSIUM ON THE VEGETATIVE AND
PHYSIOLOGICAL CHARACTERISTIC OF BASIL IN HYDROPONIC CONDITIONS

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This study carried out for evaluation effects of supplementary potassium (K) added to nutrient solution and applied to the plants grown at high sodium chloride (40 mM) concentration on Basil (*Ocimum basilicum*) in hydroponic systems. Treatments were: (1) nutrient solution alone (N); (2) N + sodium chloride (NaCl) (40 mM) (NS); (3) N + NS + potassium sulfate (K₂SO₄; 5 mM) (NSK1) in a Completely Randomized Design (CRD) with three replications. Leaf area, Shoot and root dry weight, Fv/Fm (variable chlorophyll fluorescence to maximum chlorophyll fluorescence ratio) and SPAD index negatively affected by salinity. In addition, ionic concentrations (sodium, chlorine, and potassium) increased by salinity treatments. Supplementary potassium reduced the effect of salinity on Leaf area. Shoot and root growing was increased by potassium (K) application. Potassium application increased K accumulation, but sodium (Na) and chlorine (Cl) concentrations of plant parts were decreased. It is concluded that tolerance of basil to salinity is low and potassium application can alleviate the harmful effect of salinity.

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INVESTIGATION OF THREE MEDICINAL PLANTS ON HIGH BLOOD PRESSURE

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High blood pressure (HBP) is a serious condition that can lead to coronary heart disease (also called coronary artery disease), heart failure, stroke, kidney failure, and other health problems. "Blood pressure" is the force of blood pushing against the walls of the arteries as the heart pumps blood. If this pressure rises and stays high over time, it can damage the body in many ways. Hypertension is usually not accompanied by any symptoms, and its identification is usually through screening, or when seeking healthcare for an unrelated problem. A proportion of people with high blood pressure reports headaches (particularly at the back of the head and in the morning), as well as lightheadedness, vertigo, tinnitus (buzzing or hissing in the ears), altered vision or fainting episodes.[1] On physical examination, hypertension itself can mainly be detected through ophthalmoscope, which allows visualization of the blood vessels in the retina. Hypertension can cause a number of changes that may indicate the risk of complications, and may reflect the state of blood vessels elsewhere in the body.[2] Classically, the severity of the hypertensive retinopathy changes is graded from grade I-IV, although the milder types may be difficult to distinguish from each other.[2] Ophthalmoscope findings may also indicate how long a person has been hypertensive.[1] In this study we used three kinds of medicinal plants, green tea, thyme and Borage to check the effect on blood pressure. Therefore, we collected hundred patients and each of medicinal plants was used separately in certain levels. The results of clinical trials and statistical software showed that the control the disease by green tea, and thyme is Borage, respectively. Now we recommended green tea for people with high blood pressure.

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Kish Island



CHANGES IN ESSENTIAL OIL CONTENT AND CHEMICAL COMPOSITIONS OF *ARTEMISIA SIEBERI* DURING DIFFERENT PHENOLOGICAL STAGES

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The variations in content and compositions of *Artemisia sieberi* (Asteraceae) essential oil were examined at different phenological stages (i.e. vegetative, floral budding, full flowering, and after flowering). The essential oils of air-dried samples were extracted by hydrodistillation. The yield of essential oils (w/w %) were 1.65, 1.85, 2.29 and 2.71 % at vegetative, floral budding, full flowering, and after flowering stages, respectively. The essential oils were analyzed by GC and GC-MS. A total of 56, 65, 65, and 68 components were identified and quantified at the above mentioned stages, respectively. The essential oil content showed significant increase after flowering stage. Three components, 1,8-Cineole (21.1-23.98), Camphor (11.77-18.33) and α -Thujone (8.06-13.08) were the major oil constituents of all growth stages.

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ALLELOPATHIC ACTIVITY OF THREE *SATUREJA* SPECIES AS NATURAL HERBICIDES

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Allelopathy offers an important tool for natural weed management in sustainable agriculture. Two separated laboratory experiments were conducted *in vitro* to evaluate the allelopathic potentials from three *Satureja* species namely: *S. khuzestanica*, *S. bakhtiarica* and *S. rechingeri*. Water extracts at concentrations of 0, 0.4, 1.5, 3.125, 6.25, and 12.5% (v/v) and leaf powders at the rates of 0, 30, 60, 120, 240, 480 and 960 mg/plate were used. The allelopathic effects of the tested species were examined on germination, growth and development of two Horticultural crops namely cress (*Poa pratensis*) and tomato (*Lycopersicon esculentum*) and rye (*Secale cereal*) as a noxious weed. The measured features for evaluation allelopathic potency were germination percentage, root and shoot length, fresh and dry weight, and allelopathic effect index. According to the results, *S. khuzestanica* water extract at the concentration of 12.5% had the most suppressive effect on rye seed germination. While, *S. bakhtiarica* water extract showed the maximum inhibitory effect on germination and growth indices of tomato and cress seedlings at the concentration of 3.125% (v/v). The results of inhibition effects from leaf powders of *Satureja* species indicated that *S. rechingeri* had the maximum inhibitory effect on germination and growth indices of rye, cress and tomato at the concentrations of 240, 120, and 60 mg/plate, respectively. The findings of this study showed that water extracts and leaf powders of *Satureja* species have potent herbicidal activity and could be used as natural herbicides for weed control. However, further studies are still required to investigate the application of those natural substances for weed management in sustainable agriculture.

MICROPROPAGATION OF *THYMUS CARMANICUS* USING SHOOT TIP EXPLANT

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An efficient protocol has been developed for micropropagation of *T. carmanicus* (family Lamiaceae). Multiple shoots were induced by culturing shoot tip explants excised from seeds on Murashige and Skoog (MS) medium supplemented with (0/1, 0/5, 1 and 1/5 mg/L) BA and (0/1, 0/5, 1 and 1/5 mg/L) kinetin only, and their combination with (0/2, 0/4, 0/6, 0/8, 1 and 1/5 mg/L) IBA and/or (0/2, 0/4, 0/6, 0/8, 1 and 1/5 mg/L) NAA. Root induction was achieved on MS medium containing IBA and/or NAA. The best shooting was obtained on medium supplemented with 0.1 Kin, while only a low shooting frequency was recorded for explant at BA. The result indicated that Kin compared to BA, is much more capable of inducing shoots.

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SATUREJA KHUZESTANICA ESSENTIAL OIL TREATMENTS FOR ELIMINATING *ESCHERICHIA COLI* O157:H7 FROM ALFALFA SEEDS PRIOR TO SPROUTING

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Sprouts eaten raw are increasingly being perceived as hazardous foods as they have been implicated in *Escherichia coli* O157:H7 outbreaks where the seeds were found to be the likely source of contamination. Volatile compounds occurring in the essential oil of plants were tested for their efficacy in killing *Escherichia coli* O157:H7. The objective of this study was to evaluate the potential of using the essential oil of *Satureja khuzestanica* for alfalfa seed decontamination prior sprouting. Commercially, available alfalfa seeds were inoculated with a three-strain *E. coli* O157:H7 mixture and dried to attain approximately 10⁶ CFU/g of seeds. Seeds then underwent one of several washing essential oil treatments including: 1, 2.5 and 5 mL/L for 3, 5 and 10 minutes. Distilled water was used as control treatment. Surviving populations of *E. coli* O157:H7 were enumerated by direct plating on tryptic soy agar (TSA). Washing of inoculated alfalfa seeds with *S. khuzestanica* oil (2.5 mL/L for 3 min) led to a significant ($p \leq 0.05$) reduction of *E. coli* compared to distilled water. However, further increasing the concentration of essential oil (5 mL/L for 10 min) also led to a significant ($p \leq 0.05$) decrease (4.34 log reduction) of microbial populations. Increasing the washing time (1mL/L) from 3 to 10 had significant effect on reduction of *E. coli* O157:H7 population (1.23 log reduction). The high strength disinfectant can be due to high Carvacrol content of *S. khuzestanica* essential oil (87.7). Result of germination trials indicated that *S. khuzestanica* essential oil didn't adversely affect alfalfa seed germination. Results of this study showed that essential oil of *S. khuzestanica* can be used to as a natural disinfectant to eliminate *E. coli* O157:H7 on alfalfa seeds without affecting seed viability.

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METHODS OF ESSENTIAL OIL EXTRACTION IN FLUENCE ON VARIATION OF THE ESSENTIAL OIL CONTENT IN BULM (*MELISSA OFFICINALIS L.*) UNDER DIFFERENT DRYING METHOD

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Lemon Balm (*Melissa officinalis L.*) is important due to its medicinal properties and its use as tee. Its essential oil is required mainly in the pharmaceutical, food and cosmetic industries. The properties of the plant extracts include sedative, relaxing, antibacterial, antiviral, and antispasmodic effects [Ayanoglu.,2005]. This experiment was conducted to evaluate the effect of different extracting essential oil and drying method on Method of Essential oil Extraction Influence on Variation of the Essential Oil Content in Bulm (*Melissa officinalis L.*) Under Different Drying Method was performed under laboratory condition in Education Applied Center of Agricultural Jihad at Semnan. Experiment was conducted using factorial based randomized complete block design with three Replications, therefore for this purpose, shoot of *Melissa officinalis* plants in flowerig stage, gathered from baladeh region, function of Noor city and dried in shadow, sun and oven and essential oil of it was extracted with water distillation method by clevenger and steam and water distillation method by kaiser. In order to determination of essential oil percentage by Clevenger, were selected 100 g shooting dry matter at the end of flowering period from each plot. Finally, essential oil content was determined by the following formula [Aliabadi Farahani et al., 2008]. Essential oil content = Essential oil percentage × Shoot yield. Result of this experiment showed that effect of type of essential oil extraction and various drying method of plant was significant on level o essential oil ($\alpha=1\%$). Results of means comparison shows that the highest of essential oil was related to extraction essential oil by clevenger and the lowest of its was related to Kaiser device. The highest of amount of essential oil respectively was earn by shadow drying method (1.85%), sun drying (1.41%) and oven (0.07%). Therefore in this experiment, the highest essential oil content produced by water distillation (by clevenger) and shadow drying method and the lowest amount of essential oil was earn with steam and water distillation and sun drying method.

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EVALUATION OF THE MINT ESSENTIAL OIL EFFECT ON SOME OF THE APRICOT (*PRUNUS ARMENIACA* CV. RAJABALI) FRUIT CHARACTERS DURING STORAGE

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There is an increasing trend in the use of natural compounds for organic production and storage of agricultural crops. This research was conducted to identify the effect of natural compounds such as mint essential oil (*Mentha spicata*) on the storage life of apricot (*Prunus armeniaca* cv. Rajabali) and also its effect on the apricot fruit characteristics. The suspension of this essential oil at concentrations of 0, 150, 300 and 400 mg/l was sprayed on the fruits. Before treatment, physical and biochemical properties of the samples such as weight, titrable acidity and pH were determined and then the fruit were stored in a cold storage with a 0-2 °C average temperature for 6 weeks and the mentioned quality factors were evaluated every week. Results showed that there was not any significant difference in pH, whereas, there was a significant difference in the content of TA and weight loss percentage between the samples during the 6 weeks storage. Such that, the content of TA decreased. Effect of changing the concentration of essential oils on weight loss percentage and pH was not significant. However, there was a remarkable difference in TA content between control and the others, in which, TA content decreased by using 3 different essential oil concentrations.

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INVESTIGATION OF CANNABINOIDS EFFECTS ON CANCER TREATMENT

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Cannabinoids are one group of secondary metabolites that reported in the *Cannabis sativa*. More than 60 cases of this group is found in Cannabis, the most important of them is delta-9-tetrahydrocannabinol(THC). These material have psychoactive and therapeutic properties. The effect of cannabinoids on the treatment of cancer, MS, AIDS etc has been proved. In addition phytocannabinoids, Some material was found in animals that are the most important of them Anandamide, which this group called endocannabinoids. Then, some synthetic materials such as JWH-133 were synthesized, which they called synthetic cannabinoids. For the first time in 1975 Munson discovered that cannabinoids inhibits the growth of lung carcinoma cells that their mechanism is to prevent DNA synthesis. Their activity of anti- proliferation on other cancer cells also were found. Since effect the cannabinoids on several types of cancer and their mechanisms of action has been studied. In this paper, has been studied the effects of cannabinoids, particular endocannabinoids, on the treatment of cancer and their mechanisms of action.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE SURVEY TYROSINE AMINO TRANSFERASE GENE EXPRESSION BEFORE VARIOUS CONCENTRATION YEAST EXTRACTION

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Lemon balm (*Melissa officinalis*) is one of the member Lamiaceae families. This plant has many medicinal traits and more of them dependent on rosmarinic acid. Rosmarinic is an ester of caffeic acid and 3-4 di hydroxyl phenyl lactic acid. This matter has some medicinal traits such as anti sensitive, rheumatism and cancer. The inhibitory effect of rosmarinic acid associated with salt has been revealed on HIV activity. Tyrosine amino transferase is key enzyme in biosynthesis pathway rosmarinic acid, this enzyme produce rosmarinic acid during various processes using from L-tyrosine amino acid. In this research the effect of various concentrations (0, 0.05, 0.1, 0.2 %) of yeast extraction elicitor assessed on tyrosine amino transferase gene expression in the 30 seedling *M. officinalis*, then from extraction total RNA and synthesis cDNA, the amplification gene and using foe software assayed gene expression. All of concentration caused significant increase in tyrosine amino transferase gene expression and 0.1 % concentration induced the most effect on tyrosine amino transferase gene expression. Based on the results in has been demonstrated that yeast extraction acts as an effective elicitor for improve on production of secondary metabolite there for improve the importance cost of medicinal plant.

ESSENTIAL OILS OF *Satureja* SPECIES: INSECTICIDAL EFFECT ON *TRIBOLIUM CASTANEUM* (COLEOPTERA: TENEBRIONIDAE)

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The chemical composition of the essential oils from the wild growing plants of *Satureja khuzestanica*, *S. bakhtiarica* and *S. rechingeri* were determined by GC and GC/MS analysis. The insecticidal activities of the essential oils were assayed against *Tribolium castaneum* at 27±1°C, 65 ± 5 % relative humidity and under dark conditions. The analytical data indicated that various monoterpene hydrocarbons and phenolic monoterpenes such as Thymol and Carvacrol constitute the major components of the oils, but their amounts varied greatly among the oils examined. The essential oils used at 6 concentration including: 0, 100, 500, 750, 1000 and, 1500 ppm. The data were analyzed by Polo pc and SPSS 15.0 software. The estimated LC50 values for *Satureja khuzestanica*, *S. rechingeri* and *S. bakhtiarica* were 255.239 (range 154.2-356.7), 318.191 (range 218.6-420.1) and 677.779 ppm (range 501.6-923.2), respectively. The results indicated that *S. khuzestanica* essential oil was the most effective insecticidal agent. The results indicated that the oils possess significant insecticidal activities and represent a natural source for insect control. However, further studies are required on the formulation of EOs before this technique could be commercially recommended to control insects under field conditions.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF DIFFERENT CONCENTRATION OF SILVER NITRATE ON ROSMARINIC ACID BIOSYNTHESIS IN LEMON BALM (*MELISSA OFFISINALIS*)

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Lemon balm (*Melissa officinalis*) is one of the member Lamiaceae families. This plant has many medicinal traits and more of them dependent on rosmarinic acid. Rosmarinic is an ester of caffeic acid and 3-4 di hydroxyl phenyl lactic acids. This matter has some medicinal traits such as anti-sensitive, rheumatism and cancer. The inhibitory effect of rosmarinic acid associated with salt has been revealed on HIV activity. In this research the effect of various concentrations (25, 50 and 100 mg/L) of silver nitrate elicitor effect assessed on rosmarinic acid biosynthesis in the 30 seedling *M. officinalis*. All of concentration caused significant increase in rosmarinic acid content as measured by HPLC and 100 mg/L concentration induced the most effect on rosmarinic acid biosynthesis.

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EFFECT OF VERMICOMPOST ON SEEDLING EMERGENCE AND PLANT SUBSEQUENT GROWTH IN *PLANTAGO PSYLLIUM*

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Isabgol seeds contain active substance as mucilage, large quantities of albuminous matter, fatty oil, the pharmacological inactive glucoside, and a plantiose sugar. Isabgol seed husk has the property of absorbing and retaining water which accounts for its utility in stopping diarrhea. It is also a diuretic, alleviates kidney and bladder complaints, gonorrhoea, arthritis and hemorrhoids [1-3]. Isabgol has been in medicine since ancient times, but it has only been cultivated as a medicinal plant in recent decades. Medicinal quality (swelling & mucilage contents of seed) of isabgol, were affected by cultural practice and fertilizers [2-4]. In agricultural land, soil fertility depletion is an important draw back due to continuous cultivation. Modern agricultural operation has modified the physical, chemical and biological activity of the soil. In order to increase the soil fertility, inorganic fertilizers are being widely utilized in our cultivable lands. Even though they promote the growth of crops, their toxic effect is the negative impact by means of their over utilization. To overcome all these unwanted factors the application of organic manure especially vermicompost is recommended. Vermicompost is a rich source of macronutrients, micronutrients, vitamins, plant enzymes and plant growth hormones [5, 6]. So, the present investigation was carried out to study the influence of vermicompost on emergence and growth of the *plantago psyllium*. Different percentages of vermicompost (25, 50, 75 and 100%) derived from the earthworm, was made with soil. The Seeds of *plantago psyllium* were sown in pots containing the mentioned soil-vermicompost mixtures. Percentage of emergence, and growth parameters were recorded during 30 days after cultivation. Emergence percentage and rate was better in 50% of vermicompost. Treatments with 75% of vermicompost showed important increases of plant height and fresh and dry weight of aerial and roots.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



COMPARISON OF THE ANTIOXIDANT ACTIVITY AND TOTAL PHENOLIC CONTENTS IN SOME SPECIES OF LAMIACEAE FAMILY

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Antioxidant compounds in food play an important role as a health protecting factor. In this study, The methanolic extracts of the aerial parts of nine Lamiaceae species: *Mentha spicata*, *Mentha aquatica*, *Mentha piperita*, *Stachys byzantina*, *Marrubium vulgare*, *Rosmarinus officinalis*, *Salvia officinalis*, *Thymus vulgaris* and *Melissa officinalis* were investigated for their antioxidant activity and total phenolic and flavonoid content using DPPH and Folin-Ciocalteu and potassium chloride assays respectively. The IC₅₀ of the methanolic extracts ranged between 42.67-489.97 µg/ml, total phenolic content were between 38.27-59.14 mgGAEg-1dw. *R. officinalis* and *M. vulgare* showed the most content of antioxidant activity. There was a direct correlation between total phenol and antioxidant activity which indicates that polyphenols are the main antioxidants.

THE EFFECT OF DIFFERENT DENCITIES OF ETHANOL & METHANOL ON GERMINATION OF SEED (*PLANTAGO PSYLLIUM*)

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A full study has been carried out on germination and *P. psyllium* seed growth in a lab study in April 2011, in institute of medical plants in order to evaluate the influence of different densities of methanol and ethanol in a full random plan by 3 repetitions. Regarding this, levels of (0/4, 0/8, 1/2, 1/6, 2, 3) for methanol and ethanol have been taken into study. The study result showed that the variation of density had significant effects on the percentage of germination, length of hypocotil and radicle, the ratio of hypocotil length to radicle length, fresh weight of hypocotyl, dry weight of radicle, total fresh weight, dry weight of hypocotyl and total dry weight (p<0.01) and fresh weight of radicle (p<0.05). In this research the most percentage of germination is achieved by using methanol 1/2, 1/6. Also the most hypocotil and radicle length has been obtained by using methanol 0/4. In addition, the maximum ratio of hypocotil length to radicle length using ethanol 0.8, the most fresh weight of hypocotil using methanol 1/2, the most dry weight of hypocotil in methanol 2, the most dry weight of radicle using methanol 1/6, and the most total dry weight using methanol 1/6, have been gained.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



IDENTIFICATION OF ESSENTIAL INGREDIENTS AND STUDYING THE ANTIOXIDANT EFFECT OF SATUREJA MACROSIPHON PLANT

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The genus *satureja* are perennial plants belonging to Lamiaceae family. In Iran 12 species of this genus identified which a number of them are native to Iran. The plants belonging to this genus have medicinal properties and use in traditional medicines. In this study essential ingredients from three organs i.e. flower, leaf and stem and also antioxidant effects collected from Poldokhtar region, Lorestan province and then they surveyed and compared. *Satureja Macrosiphon* plant collected from Poldokhtar on December, 2010 and after drying in the shade, plant extraction performed with soaking method. The resulting extract was concentrated with rotary machine. The oil obtained with GC/MS was analyzed. Antioxidant activity of extract performed with using of DPPH free radical and phenolic and flavonoid synthesizes. The results showed that IC₅₀ ranged 100-2000 µg/ml for leaf and stem extracts. Main constituents of essential oil of *Satureja Macrosiphon* leaves include: 2-ol bicycloheptan (17.34 %), Borneol (14.99 %), 1-ol-cyclohexan (9.27 %). In flowers oil, Borneol (11.9 %), Fenol-bis 1, 1-demetil (11.4 %), α-Pinene (11.3 %) and in stems benzene (20.4 %), bicyclopentane (11.4 %), Borneol (9.77 %) allocated essential main components to themselves. Finding of this study showed that existing synthesizes in essential (oil) sampled leaf, flower and stems were different and also studying antioxidant effect of this plant showed that this plant has antioxidant property which uses medicinal and food Industries [1, 2].

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GERMINATION REACTION OF TRIGONELLA (*TRIGONELLA FOENUM-GRACUM* L.) SEED TO APPLICATION OF BIO-STIMULATORS IN DROUGHT STRESS

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To investigate the effects of different levels of drought stress and different commercial formulations of bio-stimulators on seed germination parameters of *Trigonella foenum-gracum*, a factorial experiment was conducted on the basis of completely randomized blocks design with four replicates in 1390. Different concentrations of PEG8000 solutions for drought stress (0, -0.2, -0.4, -0.6, -0.8, -1, -1.2MPa) and bio-stimulators with commercial formulations of Aminolforte, Kadostim, Fosnutren, and Humiforte with concentration of 0.2% were applied. Results showed that effect of bio-stimulator×drought stress was significant (P<0.01) on all of parameters (except for coefficient of velocity of germination and mean germination time). Mean comparison of parameters showed that germination rate, germination percent and mean time to complete germination decreased in all bio-stimulator treatments with increase of drought stress level. With increasing of drought stress level to the concentration of 0.6MPa, radicle length, hypocotyl dry weight, and hypocotyl diameter showed a significant increase in all treatments of bio-stimulators and after that they decreased. Radicle diameter and radicle dry weight showed a decreasing trend in all treatments. In all of biostimulator treatments with increase in drought stress level, hypocotyl length decreased. Hypocotyl/radicle dry weight ratio increased in all of parameters and the most ratios was obtained in concentration of 0.4MPa. In all of treatments hypocotyl/radicle length ratio showed a decreasing trend with increase in concentration of PEG8000.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



COBALT INDUCED TAXOL PRODUCTION AND RELEASE BY CELL CULTURE OF HAZEL
(*CORYLUS AVELLANA* L.)

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Meanwhile cobalt is an essential micronutrient and is required for normal growth and takes part in redox reactions, electron transfers and other important metabolic processes in plants, a few studies have been documented on the effects of Co on the secondary metabolite production in plant cell cultures [1, 2]. Recently a few studies have been showed that elicitors/stimulators such as, chitosan, salicylic acid, methyl jasmonate, and ultrasound improved taxol and related taxanes production in suspension cultures of hazel [3,4]. Since any study has been done on the effects of cobalt on cell culture of hazel, the experiment was designed and carried out. For this the cells were treated with cobalt chloride at concentration of 25, 50 and 100 μ M. The treatments were applied on day 8 of subculture and cultures harvested on day 14. Cell growth, biomass production, electrolyte leakage, total dissolved solute, protein content, taxol production, specific yield and its release to the medium were evaluated. The results showed that cell growth as fresh weight decreased significantly by all Co concentrations compared to control but whole biomass production (dry matter) in treated cultures wasn't significantly affected. Electrolyte leakage and total dissolved solute in treated cultures media enhanced by Co concentrations compared to those of the control. Both extracellular and cell-associated taxol improved by Co and total taxol accumulation increased along with increasing Co concentrations. Most total taxol achieved at 100 μ M concentration of Co, which was 13 fold of the control culture. Taxol release also affected significantly by treatments and the highest amount (83%) measured at 50 μ M of Co concentration. Specific yield of taxol also increased with increasing Co concentration and the maximum value (48 μ g/g dry weights) achieved under effect of 100 μ M concentration of Co. The results suggest that the stimulated taxol accumulation was a stress response of the cells.

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TROPANE ALKALOID PRODUCTION IN ATROPA HAIRY ROOTS OVEREXPRESSING *PMT* AND *H6H* GENES

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Atropa belladonna is the most important commercial source for obtaining pharmaceutical tropane alkaloids such as scopolamine and hyoscyamine [1]. In many cases, overexpression of exogenous genes can improve final products [1]. In this study, we integrated putrescine N-methyl transferase and hyoscyamine β -6hydroxylase genes in to DNA of *Atropa belladonna* by an *Agrobacterium rhizogenes* construct that contains *pmt* and *h6h* genes. Leaf discs were inoculated by *Agrobacterium rhizogenes* and hairy roots appeared after 2 weeks. Induced hairy roots were cultured on phytohormone free Murashige and Skoog medium. Medium contains Cefotaxim antibiotic to eliminate the bacteria. After harvesting the hairy roots, they established in liquid medium. Transgenic DNA was confirmed by genomic polymerase chain reaction (PCR) and finally the scopolamine and hyoscyamine production were examined by HPLC.

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IMPROVEMENT OF ARTEMISININ PRODUCTION IN *ARTEMISIA ANNUA* L. HAIRY ROOTS BY BIOTIC ELICITORS

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Artemisinin, an endoperoxide sesquiterpene lactone isolated from *Artemisia annua* L. (Asteraceae), is a multifunctional drug. It has been shown to be effective against malaria- both drug resistant and cerebral malaria causing strains of *Plasmodium falciparum*- and other infectious diseases including schistosomiasis, hepatitis and numerous types of tumors [1]. Artemisinin can be biosynthesized by hairy roots of *A. Annua* [2]. In the present study we examined the effect of fungal extracts of *Fusarium oxysporum* and *Colletotrichum sp* and yeast extract as biotic elicitors on the production of artemisinin in hairy roots of *Artemisia annua* from north of Iran. Various concentrations of elicitor were added to the culture medium after 21 days. Hairy root cultures were elicited using a defined concentration of elicitor for 4 days. artemisinin production in hairy roots was increased 1.7fold (1.3 mg g⁻¹ dry wt), 1.4 fold (1.1 mg g⁻¹ dry wt) and 1.1 fold (0.87 mg g⁻¹ dry wt) by adding 0.8 mg total sugar ml⁻¹ yeast extract, and 0.4 mg total sugar ml⁻¹ mycelial extract of *Colletotrichum sp* and *Fusarium oxysporu*, respectively.

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THE EFFECT OF *PORTULACA OLERACEA* SEED ON GROWTH PERFORMANCE, IMMUNITY RESPONSE AND *JEJUNAL* MORPHOLOGY OF BROILER CHICKS

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This experiment was conducted to investigate of the effect of purslane seed on growth, blood parameters and jejunal epithelium morphology of broiler chicks on completely randomized design. Total 250 day-old broiler chicks were used and randomly allotted equally into five experimental groups designated with five replications and 10 chicks in each replication. The nutrient requirements of chickens were adjusted according to the recommended diet of Ross-308 Company. Dietary treatments included a control basal diet (without adding purslane seed), basal diet + 1% purslane seed, basal diet + 2% purslane seed, basal diet + 3% purslane seed, the basal diet + 4% purslane seed. Body weight, feed intake, weight gain, feed conversion and mortality were measured weekly during the experiment. At 3 and 4 wk of age, one bird from each replicate was randomly selected for evaluating immune system after injection of 0.5% SRBC at 7 & 14 days. Blood samples were taken on 21 & 42 days for evaluating amounts of Albomin, Total Protein, Triglyceride, Cholesterol, HDL, LDL, Bilirubin, enzymes (ALT, ALP), Glucose & Uric Acid (1). At 3, 6 wk of age one bird of each replicate were randomly selected for investigating effect of treatments on carcass components and morphology of jejunum and results were statistically analyzed (2). *Portulaca oleracea* seed had no significant effect on feed intake, BW or feed:gain ratio, abdominal fat deposition, total immunoglobulins, IgM, IgG. At 3 and 6 WK of age Purslane seed had no significant effect on villus height, crypt depth or microvillus length, width & density in the jejunum. In 3 WK of age, *portulaca oleracea* seed had significant effect on levels of LDL, HDL and Cholesterol. In 6 WK of age effects of treatments on LDL and TG levels were significant.

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PHYTOCHEMICAL RESPONSE OF PURPLE CONEFLOWER (*ECHINACEA PURPUREA* L.) TO FOLIAR APPLICATION OF HYDROALCOHOLIC SOLUTIONS IN KARAJ REGION

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A study was conducted at Institute medicinal plant (IMP) in karaj to determine the effects of foliar applications of hydroalcoholic solutions on phytochemical yield and components such as percent of chicoric acid and total flavonoid in shoot and root on Purple coneflower. *Echinacea purpurea* L. is an herbaceous perennial belong to the Asteracea family that is helpful for immune system strengthener [1]. This experiment was conducted in randomized complete block design (RCBD) with fifteen treatments and three replications in research farm in IMP in Karaj region. The treatments of this study include: control (distilled and without distilled water), ethanol and methanol aqueous solutions each one of them with 10, 20, 30, 40 and 50% (v/v). The results of this experiment indicated that the effect of treatments had significant differences ($p < 0.01$) on evaluated phytochemical traits. Maximum percentage of chicoric acid of shoot (3.14%) and root (4.04%) were found at 40% and 50% ethanol solutions, respectively. The high amount of total flavonoid of shoot (31.16 mg/g) and root (30.38 mg/g) were observed at 50% and 30% ethanol solutions, respectively. Also Maximum of chicoric acid yield in the shoot (78.95 kg/ha) ethanol and root (51.53 kg/ha) were obtained at 40% and 30% ethanol solutions, respectively. The high amount of total flavonoid yield in the shoot (59.43 kg/ha) and root (36.87 kg/ha) were found at 50% and 30% ethanol solutions, respectively. In general, these data suggest that foliar application of hydroalcoholic solution improve quantity and quality of phytochemical compounds in purple coneflower.

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ANTIBACTERIAL ACTIVITY OF IRANIAN MEDICINAL PLANTS AGAINST SOME OF THE BACTERIA

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Plant materials continue to play a major role in primary health care as therapeutic remedies in many developing countries. Medicinal herbs contain physiologically active principles that over the years have been exploited in traditional medicine for the treatment of various ailments as they contain antimicrobial properties [1,2]. This paper aims to determine the antibacterial activity of Iranian endemic plants. Some of the medicinal plants and their extracts have an antibacterial activity [3,4]. In this study, antibacterial activity of ethanol extracts of Iranian medicinal plants against bacteria by agar disc diffusion assays [5]. Antibacterial activities of ethanol extract of eight Iranian folklore herbs including *Althaea officinalis*, *Pyrethrum roseum*, *Urtica dioica*, *Ferula assa-foetida*, *Thymus daenensis*, *Satureja bachtiarica*, *Dracocephalum multicaule*, *Echinacea angustifolia* and propolis of secondary products honeybee and Amphotripcin Antibiotic were investigated against some of the bacteria. These bacteria including *Bacillus cereus*, *Streptococcus agalactiae*, *Staphylococcus aureus*, *Listeria monocytogenes*, *Salmonella typhimurium* and *Proteus*. Most of the ethanol extracts showed some antibacterial activity against the tested bacteria with the diameter of inhibition zone ranging between 5 and 34mm. Of the plants studied, the most active extracts were those obtained from ethanol extract of *Thymus daenensis* and *Satureja bachtiarica*. The bacteria in the study were sensitive to some of antibiotics, Amphotripcin (inhibition zone values of 6 to 27 mm), while was resistant to some of the plant extracts at the concentration 1250 µg/ml. The results obtained appeared to confirm the antibacterial potential of the plants investigated.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



MICROPROPAGATION OF *RUMEX TUBEROSUS* L. SUBSP. *HORIZONTALIS* VIA ORGANOGENESIS

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The genus of *Rumex* which is belonged to polygonaceae family, consist of Perennial and annual plants, that are valuable source for vitamin C. The plants of this Genus are rich resource for oxalic acid and ascorbic acid which are used widely in Food and medicine industry. Also, according to traditional medical history, the essence of their leaves has been used for fever typhoid and infection. Although many improved plant Varieties has been regenerated tissue and cell clture teqniques, thus it has more values for in vitro Studies. In *R. tuberosus* L. callus culture induction were induced on cotyledone, hypocotyl and stem tip explants. In MS medium supplemented with different concentration of 2,4-D and kinetin with 1 gr/l charcoal *Rumex tuberosus* L. granular and embryogenic calli developed and showed mature and 2% (w/v) sucrose In embryos. Hairy root appeared at later subculturing. When the osmolarity of medium Was increased, by adding %6 sucrose, cotyledon explants displayed a high capacity for Hairy roots formation. In addition to, MS medium supplemented with 1 gr/l charcoal, With %2 sucrose and different concentrations of IAA and BAP enhanced bud and then Shoot multiplication from epicotyls explants. Furthermore shoots proliferation and Developed to plantlets within 3-5 weeks at a frequency of 80%. Also in a same Treatment with %6 sucrose preferentially induced hairy roots from cotyledons.

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HAIRY ROOTS INDUCTION IN CHICORY (*CICORIUM INTYBUS* L.) BY *AGROBACTERIUM RHIZOGENES* A4 STRAIN

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Chicorium intybus L. is a biennial herb that belongs to Asteraceae family and is one of the important medicinal plants. The different parts of this plant (roots, leaves and seeds) use for the pharmaceutical applications. The roots of the plant contains medicinally important compounds that use for treating AIDS, cancer, insomnia, impotence, dismenorrhoea, splenitis and diabetes. The most important components find in chicory include flavonoids, inulin, bitter sesquiterpene lactones, coumarins and vitamins. Hairy roots are formed by transformation of plant tissues with the gram-negative soil bacterium *Agrobacterium rhizogenes*, and have been found to be a suitable technology for the production of secondary metabolites. Such cultures have genetic and biochemical stability, rapid growth rate, and the ability to synthesize natural compounds at levels comparable to those of intact plants [3, 4]. In this study, the leaf explants from four-week old *in vitro* cultured seedlings transformed by *A. rhizogenes* A4 strain. Hairy roots were found to appear within 45 days of infection. Different root lines excised and immediately transferred to 30 ml ½ MS medium containing cefotaxime (250 mg l⁻¹) in 100 ml Erlenmeyer flasks and incubated in dark on a rotary shaker at 90 rpm and maintained at 24-25 °C. The growth of eleven root lines (A⁴, B⁴, C⁴, D⁴, E⁴, F⁴, G⁴, H⁴, I⁴, J⁴, K⁴) that have more branched and more active growth were compared. The root line C⁴ had the highest growth rate in comparison to the other root lines.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



REACTIONS OF THE RELATIVE WATER CONTENT, CHLOROPHYLL, LEAF WEIGHT AND AREA OF *ECHINACEA PURPUREA* L. TO FOLIAR APPLICATION OF METHANOL AND ETHANOL SOLUTIONS

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Echinacea purpurea L. is an herbaceous perennial plant in the Asteraceae family that is used in therapy of respiratory tract infection and bacterial otitis [1]. This experiment was conducted to evaluate the methanol and ethanol foliar application effects on the relative water content (RWC), chlorophyll, leaf area, leaf dry weight of Purple coneflower. The experiment was done in randomized complete block design (RCBD) with 15 treatments and 3 replications in research farm in (ACECR) in Karaj. The treatments of this study include: control (distilled and without distilled water), ethanol and methanol aqueous solutions each one of them with 10, 20, 30, 40 and 50% (v/v). The results were indicated that the effect of treatment on traits had significant difference ($p < 0.01$). The most amount of relative water content (RWC), leaf dry weight per plant (59.61 g) was obtained at 40% methanol. The maximum of leaf chlorophyll content (46.07 SPAD), leaf area per plant (7076.74 cm²) were observed in 30% methanol. This study indicates that hydro alcoholic solutions can use as a carbon sources and a natural stimulator that increase the quantity and quality of photosynthetic organs of *Echinacea purpurea*.

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ANTIMICROBIAL ACTIVITY OF ESSENTIAL OIL OF *ECHINOPHORA CINEREA* AGAINST *RHODOTORULA MUCILAGINOSA*, *RHODOTORULA RUBRA*, *CANDIDA ALBICANS*, *ESCHERICHIA COLI O157, O111, O26*, *STAPHYLOCOCCUS AUREUS*, *SALMONELLA TYPHIMURIUM*, *PSEUDOMONAS AERUGINOSA*, *LISTERIA MONOCYTOGENES* AND *LISTERIA IVANOVII*

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The purpose of this study was to provide the examination of antimicrobial effects of essential oil of *Echinophora cinerea* against *Rhodotorula mucilaginosa*, *Rhodotorula rubra*, *Candida albicans*, *Escherichia coli O157, O111, O26*, *Staphylococcus aureus*, *Salmonella typhimurium*, *Pseudomonas aeruginosa*, *Listeria monocytogenes* and *Listeria ivanovii* by micro broth dilution assay. The plant purchased from a local grocery store at Shahrekord and was identified by the Researches Centre of Medicinal and Aromatic Plants, Islamic Azad University, Shahrekord Branch, Iran. The air-dried aerial parts were subjected to hydrodistillation using a Clevenger apparatus to obtain essential oil. Antimicrobial activity (on basis of Minimum Inhibitory Concentration (MIC)) of the plant was studied by a micro broth dilution assay. The *Echinophora cinerea* essential oil exhibited complete inhibition against *Rhodotorula mucilaginosa*, *Rhodotorula rubra*, *Candida albicans*, *Escherichia coli O157, O111, O26*, *Staphylococcus aureus*, *Salmonella typhimurium*, *Pseudomonas aeruginosa*, *Listeria monocytogenes* and *Listeria ivanovii* at 100, 125, 500, 800, 2600, 2700, 175, 800, 800, 500 and 800 ppm, respectively, by micro broth dilution assay. *Candida albicans* was the most resistant and *Rhodotorula mucilaginosa* was the most vulnerable yeast. *Escherichia coli O26* was the most resistant and *Staphylococcus aureus* was the most vulnerable bacteria. The present study was the first one to investigate antimicrobial activity of essential oil of *Echinophora cinerea*. In conclusion, the results presented here show that *Echinophora cinerea* essential oil could be considered as a natural antimicrobial source.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



SURVEY OF ALCOHOLIC FOLIAR APPLICATION ON REPRODUCTIVE YIELD OF PURPLE
CONEFLOWER (*ECHINACEA PURPUREA* L.)

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This experiment was investigated the effect of foliar of methanol and ethanol on seed and flower yield of Purple coneflower. *Echinacea purpurea* L. is an herbaceous perennial in the Asteracea family. The traditional use of *Echinacea* was considered helpful for the common cold; an immune system strengthener [1]. This study was conducted in randomized complete block design (RCBD) with 15 treatments and 3 replications in research farm in Institute of medicinal plant in (ACECR). The Treatments of this study was as follows: Controls (distilled and without distilled water), aqueous solution of methanol and ethanol, each one with levels of 10, 20, 30, 40 and 50% (v/v). The result was indicated that the effect of treatments on traits had significant difference ($p < 0.01$). The maximum of seed yield (6.11 g) and thousand seed weight (5.03g) were obtained in 50% methanol and 50% ethanol solutions respectively. The maximum of dry plant weight (1078.74 g) and capitule diameter (66.85 mm) were observed in 50% methanol and 40% methanol solutions respectively. Also The Maximum number of capitule (51.50) was obtained in 40% ethanol solutions. In addition, hydro alcoholic foliar application such as methanol and ethanol as a carbon source and biological stimulator can increase quantity and quality of seed and flower on purple coneflower.

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INVESTIGATION OF MEDICINAL PLANTS DIVERSITY OF SOUTH SLOPES OF TOUCHAL ELEVATIONS

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Identification and introduction of plant diversity in each climate to plant production and preservation of natural sources projects is important. The studied mountain region is located in 51° 22' N to 51° 27' longitude and 35° 50' E to 35° 53' latitude in north of Tehran. The highest altitude is Touchal peak with 3960 meters above the sea level and the lowest altitude is Pas-Ghale village with 1900 meters. The annual average rainfall is 200-400 millimeters. The present study was carried out to introduce the medicinal plants, particularly anticancer ones with their life forms. Also endangered and vulnerable species and their threatened status assed according to the (IUCN) criteria. Medicinal plants were collected during 2006-2009 frequently, then they were identified again exactly by local flora and other reliable resources. The gathered list of medicinal plants was adjusted with pharmacognosy handbooks and herbal medicines guides [1]. Anticancer ones were derived and classified in the other list. 40 anticancer plants were identified among of 144 medicinal species from 132 genera belong to 53 families. The largest plant family was Lamiaceae with 28 species. The life forms spectrum classified according to the Raunkaier classes revealed that they include Phanerophytes 12%, Chamaephytes 20%, Hemicryptophytes 55%, Geophytes 2%, Helophytes 1% species and Therophytes 16%. High frequency of Hemicryptophytes in this region is a reason to existence an environment with cold and temperate climate [2], also absence or low frequency of geophytes indicated a deficit and shallow soil. Enough precipitations and existence of ever rivers and waterfalls lead to presence of high frequency of lamiaceae species and some of Fern species, particularly near the rivers and wet parts. *Dracocephalum*, *Melissa*, *Thymus*, and *Ziziphora* were the most important of medicinal species. 14 species were in threatened status; among of them, *Dracocephalum kotschyi* Boiss. Is an endemic and rare species, has Endangered status that distribute on mountainous areas; rocky, stony slopes and calcareous rocks [3].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



YIELD CHARACTERISTICS OF *MELISSA OFFICINALIS* L. AT RESPONSE TO THE FOLIAR APPLICATION OF METHANOL AND ETHANOL SOLUTIONS

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Lemon balm, one of the important medicinal plant species mainly grown in natural flora, especially in Mediterranean region of Turkey, is native to southern Europe and northern Africa, and east as far as the Caucasus and northern Iran [1]. Short chain alcohols such as ethanol and methanol are reported to enhance biomass accumulation and seed germination for several C3 crop species [2]. Foliar sprays of aqueous 10-50% methanol increased growth and development of C3 crop plants [3]. The aims of this study were evaluating of the yield characteristics of lemon balm at response to the Methanol and Ethanol solutions as a new and safe technology in production of medicinal plants, based on a randomized complete block design with 12 treatments and 3 replications in the experimental field of institute of medicinal plants (IMP) in Karaj at 2010. The treatments of this study include: control (distilled and without distilled water), ethanol and methanol aqueous solutions each one of them with 10, 20, 30, 40 and 50% (v/v). The results were indicated that the effects of hydroalcoholic solutions had significant differences exist ($P < 0.01$) on 15 agronomical and morphophysiological traits. The results were indicated that the most amount of plant height in methanol 30%, stem diameter, stem number, stem fresh weight, stem dry weight, leaf number, leaf area, leaf fresh weight, leaf weight, shoot fresh weight, shoot dry weight, seed weight per plant and essential oil yield in methanol 40%, chlorophyll content and thousand seed weight in methanol 50% were obtained.

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COMPARISON OF MORPHOLOGICAL TRAITS IN 12 ECOTYPES OF THYMUS KOTSCHYANUS IN QOM REGION

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Thymus (Thymus kotschyanus) belongs to the Lamiaceae (Labiatae) family. It is one of the valuable species of plants which grows mainly in the mountainous regions [1]. These species are distributed almost all over the world, especially in Mediterranean areas [2]. From botanical point of view, this plant is considered as woody plants with short stature, and herbaceous perennial with woody base which is known as a stomach tonic, energizing, anticonvulsants, Carminative, Antitussive, Sedative, antibacterial, anti-parasitic and fungal, anti HIV infection and anti cancer [2]. Its essential oil has been mainly used in food industry, pharmaceutical, health and beauty and beekeeping. It can be found in some special areas of Qom like Gazeran, Salafchekan, Kahak, Ghahan, Qomrood, Ghanavat and Neyzar which is mostly of *kotschyanus* species. The purpose of this study was to identify morphological traits of 12 ecotypes of *Thymus kotschyanus* in Qom region. The treatments involve 12 ecotypes of *Thymus kotschyanus*, evaluated in randomized complete blocks design with three replications in the farm of Badiie research engineering station of Qom. Morphological traits including height of plant, large and small diameter of canopy, number of days till beginning of flowering and 50% of it were recorded. 5 plants were taken from each experimental unit having a highly meaningful difference between each treatment. Ecotype Number 30 was the highest one and had the largest large and small diameter of canopy. Ecotype number 31, 17, 15 and 37 were the least in number of days till beginning of flowering and 50% of it. The least number of days till beginning of flowering and 50% of it is for ecotype number 15 which is investigative of its prematurity.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



STUDY OF INTERACTION EFFECTS OF MYCORRHIZA AND BIOFERTILIZER ON SOME QUANTITATIVE CHARACTERISTICS OF GARLIC (*ALLIUM SATIVUM* L.)

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In order to study the effects of two mycorrhizae species and Nitroxin on yield and yield components of garlic (*Allium sativum* L.), an experiment was conducted in a factorial arrangement based on a Randomized Completed Block design with three replications in the growing seasons of 2010 at the Experimental Farm of College of Agriculture, Ferdowsi University of Mashhad. The experimental treatments were all combination of two mycorrhizae species (*Glomus mosseae* and *Glomus intraradices*) and control; and present and not present of Nitroxin (include *Azotobacter* sp. and *Azospirillum* sp.) as a biofertilizer. Results showed that both two mycorrhizae species had superior effect on most of studied criteria compared with control. Bulb weight per plant was significantly affected by mycorrhizae species. *Glomus mosseae* and *Glomus intraradices* increased bulb weight per plant by 48 and 29 percent compared with control, respectively. Nitroxin had a significant effect on length and diameter of bulbs. Length and diameter of bulbs were increased by 13 and 8 percent in Nitroxin compared with control, respectively. Interaction effects of mycorrhizae and Nitroxin treatments on all studied criteria were significant. Interaction effects of studied treatments showed that *Glomus mosseae* had better effect on most of studied criteria at present and not present Nitroxin treatments. Nitroxin had synergistic effect on mycorrhizae treatments compared when these treatments were used without Nitroxin. The highest (4306 kg/ha) and the lowest (1665 kg/ha) economic yield (bulb yield) were obtained at *Glomus mosseae* + Nitroxin and control (without mycorrhiza and Nitroxin), respectively. Generally our results revealed that using biological inputs may decrease chemical fertilizers application and their environmental effects, and will increase sustainably of crop production in long term.

EFFECT OF UV TREATMENT ON BIOCHEMICAL CHARACTERISTICS IN *MALVA NEGLECTA* CALLUS CULTURES

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Plants use sunlight for photosynthesis and, as a consequence, are exposed to the ultraviolet (UV) radiation that is present in sunlight. Ultraviolet exposure can induce oxidative stress in plant cells therefore these cells normally must use several different defensive metabolic pathways after exposure to UV. Among defense mechanisms are reactive oxygen scavenging compounds and UV-absorbing molecules such as phenolic compounds derivatives and their biosynthetic machineries. The objective of this study was to evaluate the effects of UV-B and UV-C on UV absorbing compounds (e.g., phenolic compounds, proteins) of callus-cultured *Malva neglecta* cells. Callus cultures were established in vitro from leaf explants of *Malva neglecta* and were subculture several times until a rapid growing cell line was obtained. The calli were exposed to different doses of UV irradiation as follows: 0, 432, 864, and 1296 j/m² for UV-B and 0, 612, 1284, and 1836 j/m² for UV-C, corresponding to 0, 30, 60, and 90 min irradiations, in tandem. This study showed that exposure to UV-B and C reduced the viability of malva cells, compared to the control cells. The contents phenolic acids i.e., gallic acid, tannic acid, benzoic acid, ferulic acid, and cinnamic acid in the cell wells of UV-treated cells were significantly higher than those of the control ones. Protein contents of malva cells decreased to 50% of the control after 30 min exposure to UV, and continuously decreased along with the increase of exposure period.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF BIOFERTILIZERS ON SOME QUANTITATIVE AND QUALITATIVE CHARACTERISTICS OF SESAME (*SESAMUM INDICUM* L.) UNDER ECOLOGICAL CROPPING SYSTEM

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In order to evaluate the effects of different Plant Growth Promoting Rhizobacteria (PGPR) on yield and yield components of sesame, an experiment was conducted in a Randomized Complete Block Design with three replications at Research Station, Faculty of Agriculture, Ferdowsi University of Mashhad in 2009. Experimental treatments were: 1) Nitragin (contain *Azotobacter* sp., *Azospirillum* sp. and *Pseudomonas* sp.), 2) Nitroxin (contain *Azotobacter* sp. and *Azospirillum* sp.), 3) Super nitro plus (contain *Azospirillum* sp., *Bacillus* sp. and *Pseudomonas* sp.), 4) Phosphate solubilizing bacteria (contain *Bacillus* sp. and *Pseudomonas* sp.), 5) Bio Phosphate (contain *Bacillus* sp. and *Pseudomonas* sp.), 6) Nitroxin + Phosphate solubilizing bacteria, 7) Nitroxin + Bio Phosphate and control. The results showed that seed yield affected by PGPR and Nitroxin + Phosphate solubilizing bacteria treatment had superior effect on seed yield compared with other treatments. Superior effect of Nitroxin + Phosphate solubilizing bacteria treatment also was shown on plant seed weight and harvest index. Nitragin bio fertilizer, Nitroxin + Bio Phosphate, Nitroxin + Phosphate solubilizing bacteria, Bio Phosphate, Phosphate solubilizing bacteria, Nitroxin treatments increased dry weight of capsules per plant 62, 53, 51, 36 and 30 percentage compared with control, respectively. Although, the effect of PGPR was not significant on sesame seed oil content but Bio Phosphate and Nitragin treatments increased seed oil content by 1 and 1.5 percent, respectively. Generally, our results showed that utilization of PGPR can improve seed yield and to some extent seed oil content, which can decrease dependence of sesame seed production to chemical fertilizer, decrease negative environmental impacts and as an environmental friendly components can improve sustainable agriculture development.

EFFECT OF MYCORRHIZA ON SOME QUANTITATIVE AND QUALITATIVE CHARACTERISTICS OF SESAME (*SESAMUM INDICUM* L.) IN CONDITION OF ORGANIC FERTILIZER APPLICATION

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In order to evaluate effect of simultaneous application of mycorrhiza and organic fertilizers on some quantitative and qualitative characteristics of sesame (*Sesamum indicum* L.), a experiment based on RCBD design with three replications was conducted in 2009-10 growing season in Research farm of Ferdowsi University of Mashhad, Iran. Treatments of experiment containing 1-mycorrhiza (*Glomus mosseae*), 2- mycorrhiza + compost, 3-mycorrhiza + vermicompost, 4-mycorrhiza + sulfural geranole, 5-compost, 6-vermicompost, 7-sulfural geranole and 8-control (without fertilizer). The results showed that effect of different organic and biological fertilizers was significant on seed yield, and mycorrhiza in both condition of single and mixed with organic fertilizers of sulfural geranole and vermicompost increased the seed yield, compared to control. Biological yield, in simultaneous application of vermicompost and sulfural geranole with mycorrhiza was increased significantly compared to single use of this fertilizers. Effect of all studied organic fertilizers with mycorrhiza increased oil content of sesame that seed oil was increased in simultaneous application mycorrhiza and each of compost, vermicompost and sulfural geranole compared to separate application of mycorrhiza 12, 13 and 10 percentage respectively. In general, the results showed that the simultaneous use of ecological inputs can improved quantitative and qualitative characteristics of plant, moreover decreased environment risks of chemical inputs and ensure sustainability of production in long time with this way.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE INFLUENCE OF VARIOUS NITROGEN LEVELS ON YIELD AND AMOUNT OF TOTAL ALKALOIDS OF PERIWINKLE

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Periwinkle (*Cathartus roseus* L.) is one of the most important medicinal plants, which is a rich source of bioactive compounds including alkaloids. Considering the high value alkaloids of vincristine and vinblastine in pharmaceutical industries, any increase in the amount of alkaloids in plant is a valuable economic aspect. This research has been done to investigate the different levels of nitrogen on foliage yield shoot tips and amount of total alkaloids of periwinkle in a Completely Randomized Design with 4 replications. The results showed that, shoot fresh and dry weights were increase non-significantly with adding nitrogen fertilizers. Also, the data showed that, total alkaloid percentage was not significantly different among nitrogen levels. The highest percentage and yield of vincristine alkaloid were recorded in the control treatment and the highest percentage and yield of vinblastine alkaloid were observed in 150 nitrogen kg/ha treatment.

A STUDY ON SELECTIVE ANTIBACTERIAL ACTIVITY OF *TEUCRIUM POLIUM* ESSENTIAL OIL ON SOME PROBIOTIC AND PATHOGENIC BACTERIA

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Due to the side effects of chemical and synthetic antimicrobial agents and emerging increase in bacterial resistances, more studies have recently focused on characterization of novel potential natural antimicrobial agents of plant, animal and microbial sources. Such substances are thought to have more half life and fewer side effects. Organoleptic, antioxidant and protective effects of essential oils on food products have attracted many attentions in food industries. Probiotic bacteria have significant effects on the balance of gastrointestinal tract normal flora and consumers' health. In the present study, biochemical composition and antibacterial effects of *Teucrium polium* essential oil have been evaluated against some probiotic bacteria compared to some bacterial pathogens of clinical importance. The chemical analysis of the essential oil by Gas chromatography/ mass spectrophotometer (GC/MS) shows the presence of 58 substances (90.48%) mainly including Bicyclodec-1-ene and 1, 3-Cyclooctadiene Respectively. Minimum inhibitory concentration of the essential oil determined using resazurin as bacterial cell growth indicator shows the highest antimicrobial activities against *Bacillus cereus* and *Pseudomonas aeruginosa*. The highest MIC values were observed in cases of *Escherichia coli* and *Salmonella typhimurium*. Probiotic bacteria used in this study were able to growth at the highest concentration of used essential oil. These results indicate that this essential oil has a high potential of antibacterial effect on different bacterial pathogens, but lactic acid bacteria are resistant. This essential oil can be used in fermented products as a natural preservative and additive. Therefore, it can be suggested to purify and evaluate the active substances of this essential oil for future application as antibacterial agent and food preservative to combat pathogenic and toxigenic microorganisms.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EXTRACTION PROCESS FOR PRODUCTION OF PURIFIED CARNOSIC ACID AS A NATURAL ANTIOXIDANT

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According to Food and Drug Administration antioxidants are defined as “substances used to preserve food by retarding deterioration, rancidity, or discoloration due to oxidation”. Because of these concerns, there has been an increasing interest in the use of natural antioxidants in food processing. Carnosic acid is the primary phenolic diterpene compound existing in rosemary plant. It is reported that in edible oils carnosic acid is significantly more effective than other natural antioxidants, as well as synthetic antioxidants such as BHA and BHT. It improves color stability and oxidation inhibition of processed meats and is readily soluble in edible oils. In this paper a process for the extraction of carnosic acid from rosemary plant is described. Acetone is used as a solvent due to its selectivity. It extracts all of the carnosic acid, while it extracts less of the undesirable components. The degree of extraction of the carnosic acid is greater than 90%, while the carnosic acid purity in the solids of the extract is between 20% and 30%. A water miscible solvent such as aqueous sodium carbonate is added to the extract to isolate the carnosic acid. Large amounts of impurities are made nearly entirely insoluble by adding additional water and the carnosic acid salt remains insoluble. The insoluble impurities are separated by filtration. The volatile compounds associated with the odor and taste of the spice is separated by liquid-liquid extraction with a suitable solvent such as hexane. So the carnosic acid salt remains in the aqueous phase. Then the solution is acidified to precipitate the purified carnosic acid and is removed by filtration. In this process due to this fact which acetone is a selective solvent and minimizes extraction of chlorophyll from the plant, and also using hexane extraction of the extract and finally avoiding heating of the process, the undesirable color and odor in the carnosic acid product is minimized [1-4].

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EFFECT OF COVER CROPS AND BIOFERTILIZERS ON RADIATION ABSORPTION AND USE EFFICIENCY OF SESAME (*SESAMUM INDICUM L.*)

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In order to estimate light extinction coefficient and radiation use efficiency of sesame a split plot arrangement of two factors based on randomized complete block design with three replications was conducted in 2009-10 growing season. Cultivation and no cultivation of *Lathyrus* sp. and Persian clover (*Trifolium resopinatum*) as cover crop in autumn assigned to the main plots. The sub plot factor consisted of three different types of biofertilizers plus control, including 1-nitroxin (containing of *Azotobactersp.* & *Azospirillumsp.*), 2- biophosphorPSB (containing of phosphate solubilizing bacteria, *Bacillus* sp. & *Pseudomonas* sp.), 3- biosulfurSSB (containing of *Thiobacillus* sp.) and 4- control (no fertilizer). The results showed that application of biofertilizers resulted to 15 days shorter period to achieve maximum leaf area index compared to control and as a result, the maximum fraction of absorbed radiation and consequently sesame dry matter produced at the sixtieth day after emergence, 15 day sooner than control. Sesame dry matter production after cover crops cultivation was 19 percent higher than no cover crop cultivation treatment. Although, light extinction coefficient in control (no biofertilizer) was higher than biofertilizer treatments (0.78 vs. 0.69), but radiation use efficiency (RUE) in nitroxin and biosulfur was higher compared to control (1.76, 1.75 and 1.63 respectively) which resulted to highest biological and seed yield and harvest index. Sesame radiation use efficiency in plots with cover crop was 0.12 higher than plots with no cover crop. In this research, the total mean sesame RUE estimated of 1.68 gMJ⁻¹ (R²=0.95). In general, these results indicated that application of nitroxin and biosulfur combined with cover crops cultivation enhanced utilization of radiated and absorbed radiation by sesame canopy and consequently improved yield.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



STUDY THE EFFECT OF VARIOUS APPLICATION TIME OF IBA ON ROOTING OF ROSEMARY (*ROSMARINUS OFFICINALIS* L.) CUTTING

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Rosemary (*Rosemarinus officinalis* L.) is a wooden, perennial and aromatic plant with aciform (*Rosemarinus officinalis*) leaves from Lamiaceae family. In order to increase the rooting of Rosemary cutting, a 2000 PPM solution of Auxin is applied. Four application times (5, 10, 15 and 20 seconds) were compared using a RCBD with 4 replications. 60 days after planting, number of roots, length of longest root, number of shoots, length of longest shoot, number of flowers, and rooting percent of cuttings were measured. Data were statistically analyzed by SPSS. Upon the results, the best Auxin application time for more rooting is 5 seconds ($\alpha=5\%$). 10 and 15-seconds application times produced the most roots per cutting ($\alpha=1\%$). The longest root was produced by 5-second treatment ($\alpha=5\%$). Application times had no significant effect on number of shoots, length of shoots and number of flowers, statistically. Thus, treating in IBA solution (2000 ppm) for 5 seconds is the best for rooting Rosemary cuttings.

EFFECTS OF COLCHICINE INDUCED POLYPLOIDY ON SOME MORPHOLOGICAL AND ANATOMICAL CHARACTERISTICS OF MEDICINAL BORAGO (*BORAGO OFFICINALIS*: BORAGINACEAE)

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Colchicine induced polyploidy is an effective method for increasing secondary metabolites products in many medicinal plants [2]. Such modified plants differ in some morphological and anatomical features in relation to the normal ones. Indeed, some characteristics such as the size of flowers, leaves, seeds and stomata of induced plants, are increased [3]. In the present work effects of different concentrations of colchicine on medicinal borage (*Borago officinalis* L.: Boraginaceae) were investigated. For this, the seeds of studied plant obtained from a reputable supplier were cultivated in hydroponic medium followed soaking in 3 concentrations of colchicine solution (0, 0.05 and 0.1 %), respectively. The experiments were conducted in random factorial design with 3 replicates. The mean and standard deviation of characteristics in modified plants were scored. All experiments were also performed in Research Center of Soilless Cultivation, Isfahan University of Technology. The results showed significant increases in wet and dry biomass, total chlorophyll content, leaf area, stem diameter, width and length of stomata guard cells and thickness of hairs at the bases in plants treated with 0.05 % concentration of colchicine. Evidently, concentration of 0.1 % of colchicine had poisonous effect on the borage seeds. Some seeds in 0.1 % concentration test showed low germination rate and were without any roots. Medicinal borage has many useful medical properties including sedative, diuretic and mild antidepressant properties and has also tannins, mucilage, organic acids, and minerals such as potassium nitrate and calcium [1, 4]. Therefore, induction of polyploidy in this traditional medicine plant is valuable.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF ALCOHOLIC FOLIAR APPLICATION ON YIELD OF SECONDARY METABOLITE IN THYME (*THYMUS VULGARIS L.*)

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Thymus vulgaris L. is an important medicinal plant of Lamiaceae family. For its medicinal properties can mention to helpful for therapy of cold and respiratory disorders through existence of Thymol and Carvacrol [1]. In order to evaluate the effect of alcoholic foliar application of methanol and ethanol on yield of secondary metabolites in Thyme a field study was conducted at research farm in IMP in Karaj. The experiment was done in randomizing complete block design (RCBD) with 14 treatments and 3 replications. The Treatments of this study are as follows: control without spraying, aqueous solution of ethanol and methanol each one with levels of 10, 20, 30, 40 and 50 % (v/v) and aqueous solution of mixed ethanol and methanol with levels of 5, 15 and 25 % (v/v). The result of this study was indicated that the effect of treatments on traits had significant difference ($p < 0.01$). The Maximum percentage of essential oil (1.5%) and yield (34.82kg/ha) were observed at 50% ethanol and 15% mixed methanol and ethanol solutions, respectively. Also Maximum percentage of Carvacrol (0.66%) and yield (0.14 kg/ha) were found at 10% ethanol solutions, respectively. Also Maximum percentage of Thymol (52.94%) and yield (16.82) were obtained at 20% ethanol solutions, respectively. In addition, alcohol foliar applications cause to increases the secondary metabolite biosynthesis in The *Thymus vulgaris L.*

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THE EFFECT OF METHYL JASMONATE ON Na^+ UPTAKE CAPACITY AND ION BALANCE IN *BORAGO OFFICINALIS L.*

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Methyl jasmonate is a one of the linolenic acid derivatives and one of the plant growth regulation substances. These substances had a good effect on plant resistance against biotic and abiotic stress. *Borago officinalis L.* is an annual plant from the Boraginaceae family. This plant consists of some useful mineral such as Mn, Mg and mucilage and etc. It has been considered as a medicinal plant. In this research we studied the effect of Methyl jasmonate on Na^+ uptake capacity and increasing tolerance against salinity on Borago plant in hydroponic culture. The trial was performed in a random-two factors design with 4 concentration of Methyl Jasmonate (0, 0.01, 0.05, 0.1 $\mu\text{M/L}$) and 4 concentration of NaCl (0, 60, 100, 200 mM/L) with 3 replicate in Soilless Culture Research Center, Isfahan University of Technology, then Na^+ , K^+ , and Ca^{+2} content were measured with ICP. Result showed that Na^+ content increased significantly in plants that treated with NaCl especially in aerial part and plants that pretreated with Methyl jasmonate. On the other hand, the application of Methyl jasmonate increased Ca^{+2} and K^+ in plants that treated with NaCl. Thus we concluded that Methyl jasmonate increased Na^+ uptake capacity and then we can use from these compound for phytoremediation in saline soil.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ASSESSMENT OF PHENOLIC COMPOUNDS AND ANTIOXIDANT ACTIVITY OF DIFFERENT FRUIT PARTS OF POMEGRANATE (*PUNICAGRANATUM L.*) DURING DEVELOPMENT

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Pomegranate (*punicagranatum L.*) is an important Iranian-native fruit, which is a rich source of bioactive compounds and has been used extensively in the folk medicine of many centuries. Although, data about the importance of pomegranate in human nutrition has increased widely in the last years, the bioactive compounds and antioxidant activity of different fruit parts of pomegranate during fruit development have not yet been studied in detail. Thus, the aim of the present study was to evaluate changes of total phenolics, total tannins, condensed tannins and antioxidant activity in the peel, juice and seeds of pomegranate cv. 'Rabbab' in three different stages including unripe, halfripe and fullripe. This study showed that there are significant differences in among different stages as all measured parameters as concerned. The data indicated that the content of total phenolics, total tannins, condensed tannins and antioxidant activity decreased in different fruit parts during fruit development. Also, the results showed that the amount of total phenolics, total tannins, condensed tannins and antioxidant activity in peel were more than juice and seeds. In addition to, the results provide important data on the changes in phenolics compounds and antioxidant activity of different fruit parts of pomegranate during fruit development, emphasizing that pomegranate fruit can be a good source of bioactive compounds.

CHEMICAL DIVERSITY OF *SATUREJA MUTICA* FICH. & C.A.MEY IN IRAN

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Iran is one of the distribution centers of *Satureja* species. Knowledge about the variation among accessions of different species of *Satureja* is necessary for domestication and homogeneity of raw material. Due to the presence of phytochemicals such as carvacrol, thymol, ρ -cymene and γ -terpinen as well as the strong antioxidant activity, essential oil of different *Satureja* species are widely used in food and pharmaceutical industries. *S. mutica* is one of the native species of Iran growing on calcareous rocks in north and northeast of the country. In present study, identification of phytochemical constituents of essential oils of more than 58 individuals of seven different populations of *S. mutica* was done using GC-MS. Results showed that the populations of Darkesh and Garmabdasht had the highest and the lowest variations of oil constituents, respectively. Cluster analysis divided the populations into three different groups. The first group included Darkesh and Keshanak populations with Carvacrol (35.83%), Thymol (32.28%), and ρ -Cymene (13.75%), as the main constituents. In populations of Namnik, Pono and Manjil, Thymol (53.11%) was the main compound. Population of Tangegol was placed in third group due to the high amounts of Carvacrol (70.44%), and Borneol (9.65%). In conclusion, present study showed three different chemotypes of Carvacrol/Thymol/ ρ -Cymene, Thymol/carvacrol/ ρ -cymene and Carvacrol/Borneol among Iranian populations of *S. mutica*.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF DIFFERENT LEVELS OF ANIMAL MANURE AND WATER STRESS ON YIELD AND ESSENCE OF PEPPERMINT

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In order to study the effect of different levels of water stress and animal manure on yield and essence of peppermint (*Mentha piperita L.*) a pot experiment was conducted in greenhouse with 12 factorial treatments and three replicates. The experimental design was as two factor factorial completely randomized block design having four level of water stress (without stress or irrigation at field capacity (FC), slightly stress or 80% of FC, moderately stress or 60% of FC and sever stress or 40% of FC) as first factor and three levels of animal manure (10, 20, 30 ton/ha) as second factor applied during the plant growth. Fresh and dry herb yield, leaf area/plant, number of leaves and essence percentage were measured. The results showed that manure had not a significant effect on leaf area and number of leaves, but it was significant on essence percentage. Based on results, using 15 ton/ha animal manure could be recommended for the highest essence yield in peppermint. There was a significant effect of water stress on fresh and dry herb yield, leaf area/number of leaves and essence percentage ($P < 0.01$). The highest amount of fresh and dry herb yield of peppermint was belonged to 30 ton/ha of animal manure and without stress or irrigation at FC. There was an interaction between manure and water stress on fresh and dry herb yields, number of leaves and essence percentage. There were no significant effects on leaf area/plant for interaction between manure and water stress in this study. It concluded that medium level of manure (20 ton/ha) with the lowest level of water stress (irrigation with 80 % FC) recommended for herb and essence percentage.

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THE EFFECT OF VARIOUS LEVELS OF BIO-STIMULATORS ON GERMINATION OF SEED & PLANTLET GROWTH AND OPERATION OF *PLANTAGO PSYLLIUM*

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Production and supply of chemical fertilizers, gradually reduces the quality of agricultural crops as well as using them in soil which causes destruction in environment and natural cycle. Therefore, biological research and production is considered as an essential step in this regard. To evaluate different bio-stimulators (Fosnutren, Kadostim, AminolForte, HumiForte) with density of (0, 0.2, 0.4, 0.6 and 0.8 volume percent) a research was done by a completely randomized design by 3 repetitions in Seed Technology Laboratory on seed germination traits and plantlet growth of *P. psyllium*. In order to survey different bio-stimulators on the operation of *Plantago psyllium*, a test was also done with three times spraying, each having an interval of 15 days, pot plan, randomized complete block design, 3 repetition in greenhouse of Department of Cultivation and Development, Institute of Medicinal plants Jihad Daneshgahi in Karaj. each contains two levels of 1.5 and 0.75 mm per pot which was solved in 50 mm water. Results illustrated that different levels of various Bio-stimulators on growth parameters in laboratory condition had a meaningful effect ($p < 0.01$) but no effect on percent and rate of germination. So Most hypocotyls length, Fresh & Dry weight of Hypocotyl, Total fresh & Dry weight in Kadostim treatment 0.2% volume and most H/R ratio in HumiForte treatment 0.8% volume, and most radicle length, Fresh & Dry weight of radical were observed in control treatment. Also, the greenhouse results showed that bio-stimulators had a meaningful effect on all growth parameters ($p < 0.05$). In this test, most of root length, Crown diameter, Chlorophyll dosage, Number of leaves per plant, Leaf length and width, Spike length in Kadostim 1.5 mm per pot, increase in number of axillary shoot and number of were perceived in Fosnutren treatment 1.5 mm per pot.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



MORPHOLOGICAL CHARACTERS ASSOCIATED WITH ESSENTIAL OIL CONTENT OF *SATUREJA MUTICA* USING PATH ANALYSIS

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Different species of *Satureja* have industrial usage due to the presence of carvacrol and thymol. *Satureja mutica* is distributed in north and north east of Iran. As a part of breeding program of *Satureja mutica* and to recognize the morphological characters describing essential oil production, in present study, correlation and regression analysis were used. The variables affected on essential oil synthesis were analyzed with path analysis method. The obtained results showed that characters such as plant height, leaf length and the calyx length have the highest direct positive effect on essential oil production. On the contrary, the length of verticillate and bract length had the highest direct negative effect on essential oil production. Characters such as dry weight and the length of inflorescence had the lowest direct coefficient, respectively. The highest indirect positive effects were belonging to length of inflorescence via plant height (0.238) and length of verticillate via calyx length (0.218). On the other hand, the length of calyx via the length of sonbolche (-0.251) had the highest negative indirect effect. Based on the obtained results it seems that parameters like plant height, calyx length, leaf length and the length of side branches directly influenced the essential oil production and among them plant high are the most important characters involved in the yield of essential oil and should be care in the breeding program of *Satureja mutica*.

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LAOOQ: SELECTIVE RESPIRATORY DOSAGE FORM USED IN MEDIEVAL PERSIA

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Since ancient civilization, medical preparations of natural medicaments have been practiced to produce a therapeutic effect. Dawn the civilization three natural sources (herbal, animal and mineral) were common therapeutic preparations which were greatly practiced within compound remedies. Herbal medicine was applied either individually or in combination with other natural medicaments [1]. By going through the history of Persia, many medical and pharmaceutical documents of these preparations would be found. Accordingly a number of pharmaceutical dosage forms have been reported in Traditional Persian manuscripts. Linctuses (*Laoq*) are of mentioned natural dosage forms which are roughly neglected in contemporary medicine. The form was widely used for respiratory ailments [2] in Traditional Persian Medicine. Accordingly current study aims to present different *Laoq* herbal formulations along with their considerations and applications. Therefore most popular pharmaceutical manuscripts of Persian medicine from 9th to 18th century AD were studied and cited linctuses were derived by searching the term *Laoq*. Traditional linctuses (*Laoq*) are viscous preparations of medicinal herbs with a viscosity between syrup and electuary and should be taken orally by licking. Overall more than 100 different herbal *Laoq* formulations have been remarked by Persian practitioners and honey is the base ingredient. Moreover Rose syrup (*Jullaab*), grape concentrated juice, almond oil and cow butter may be applied in this dosage form. *Laoq* formulation is not only a kind of traditional dosage form but it may be a good candidate for formulation of new respiratory medicines. As the form can release active components gradually it can be applied in form of retard formulation. This study presents the traditional pharmacological approaches for respiratory diseases. Thereby reported natural preparations can be selected for new research in complementary medicine.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



STUDIES OF INHIBITORY EFFECT OF THREE MEDICINAL PLANTS AGAINST
MUSHROOM TYROSINASE

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Some of medicinal plants are a source of tyrosinase inhibitors which can improve food quality. The present study is aimed to study the tyrosinase inhibitory effect and its kinetic properties in the presence aqueous and methanolic extracts from *Quercus infectoria*, *Terminalia chebula* and *Linum usita tissimum*. Different concentrations of the extracts were examined against L- tyrosine oxidation in comparison to kojic acid and their IC₅₀ were calculated by probit analysis. The tyrosinase inhibition kinetics, analyzed by Lineweaver–Burk plots and the parameters of K_m and V_{max} for each extract was calculated using Lineweaver burk equation. RESULTS: The results show that the methanolic extracts of *Q. infectoria* (MEQI) and *T. chebula* (METC) potentially inhibit mushroom tyrosinase with IC₅₀ values of 3.34 and 3.87 µg/mL respectively in comparison to kojic acid (IC₅₀ value = 1.56 µg/mL). The MEQI and METC exhibited the most V_{max} (= 81.96 and 78.74µg/mL/min respectively). This activity is comparable with one of kojic acid (V_{max}= 103 µg/mL/min). The MEQI and METC also have shown the lowest value of K_i (0.20 and 0.44 respectively) in comparison to kojic acid (K_i= 0.18). The MEQI and METC would be developed further as a natural source of tyrosinase inhibitors.

THERAPEUTIC EFFECTS OF HIGHER FUNGI IN TRADITIONAL IRANIAN MEDICINE AND
MODERN STUDIES

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Edible fungi have been considered by human being for a longtime. In the texts of traditional medicine, there is interesting description of several species of fungi in their Monograph about therapeutic properties, disadvantages and correct usage of them. In recent years scientists have studied the biological activities of macromycetes on different pathologies. Since the consumption of mushrooms is increasing these days, this study is evaluating effects of nutritional-therapeutic of fungi from the perspective of traditional and modern medicine, to better take advantage of native species in Iran and provides research development about new methods of treatment, medication and drug discovery. Fungi monographs in traditional medicine resources were studied and their therapeutic effects and adverse effects. For their Persian name that had been noted in traditional books, their scientific name was found. To achieve their effects in new studies, mainly, we used from databases such as Pub Med and Google scholar and Science Direct. Two main groups of fungi in traditional medicine are “Fotr” and “kama’at”. That they are included: *Agaricus spp* (Tarsoos-Ahmar, Gharyghoon-Ahmar), *Tuber spp* (Shahmat-al-Arz, Kama’at, nabat-i- raed, kam’at, Ma’azooz), *Polyporus officinalis* (Gharyghoon-Abyaz), *Morchella esculenta* (Ghooshna), *Boletus edulis* (Bulita), *Terfezia claveriji* and *Lycoperdon spp.* (Fogh, Donbalan). From the perspective of traditional medicine, except Gharyghoon that it’s nature is hot and dry, Fotr and Kama’at are cold and wet and they have 2 types: edible and Inedible. In traditional medicine, eating them too much has created bad digestion and colic and gastralgia and hesitency, Anesthesia, Asthma. On the other hand, some forms of drug of Fotr and Kam’at are useful to treatment of some eye diseases such as Psorophthalmia and some forms of drug of gharyghoon are useful to headache, Liver disorders, Kidney Stones, Intestinal hernia, Umbilica hernia and its topical pharmaceutical form is useful for joint pain and gout. In evaluation of new studies, have been observed therapeutic effects for these fungi too. For example: Antioxidant and antimicrobial effects, reduction in blood sugar, Anti-tumor, immunomodulator, reduction in blood pressure and intestinal disorders. Many of the proven effects of fungi, for example reduction in blood sugar, there has been in traditional medicine. Research in this area, by Using modern methods and traditional methods, can be used for the production of effective drugs and Taking advantage of the nutritional effects of useful spices.



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ENHANCEMENT OF TAXOL PRODUCTION BY SQUALESTATIN IN CELL SUSPENSION
CULTURE OF *TAXUS BACCATA*

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Anticancer drug taxol is biosynthesized mainly in *Taxus baccata* bark, although other congeneric species are also reported to produce various amounts of either taxol or its derivatives [1]. Taxol is the most important taxane ever used in treating a variety of cancers including breast, ovarian, lung, head, and neck cancers. Demand for taxol and its derivatives are growing rapidly [2]. The most important species of the genus is *T. baccata* whose different parts produce diterpene alkaloids and particularly taxol [3]. In this study, cell suspensions of *T. baccata* (calli derived from embryos) were cultured in the modified Gamborg's B5 media in presence of 0, 0.1, and 1 μ M squalestatin. Production of taxol in cell suspension cultures was then quantitatively measured using HPLC after 1 week. Results showed that production of taxol in cell suspension was increased by 2.75- fold in presence of 0.1 μ M squalestatin. Production of taxol was increased by 2-fold in presence of 1 μ M squalestatin. Results suggested that elicitation conditions were significantly effective in improving taxol production in cell suspension cultures.

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EFFECT OF SQUALESTATIN ON THE PRODUCTION OF BACCATIN III IN CELL
SUSPENSION CULTURE OF *TAXUS BACCATA*

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Taxol is a diterpenoid secondary product obtained from *Taxus* spp. It is currently the best known drug, approved for use in treatment of breast, ovarian, nonsmall cell lung cancers and AIDS-related Kaposi's sarcoma [1]. Alternative sources of taxol have been sought to address the low yield of taxol from yew bark extraction, and regard to restrictions of yew trees harvesting. Currently, semisynthesis of taxol from its precursor (baccatin III) which is isolated from the needles of yew is an immediate and renewable source for the drug [2]. Squalene synthase is an endoplasmic reticulum associated enzyme that condenses two FPP molecules to squalene in the biosynthesis of sterols [3]. This Enzyme is potentially inhibited by fungal metabolite namely squalestatin [4]. In this study, the amount of baccatin III in cell suspensions of *T. baccata* leaves cultured in B5 medium was quantified using HPLC. Results showed that amount of baccatin III was significantly increased in treated samples with squalestatin compared to control.

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TAGETESERECTA, A POTENTIAL MEDICINAL PLANT FOR DISCOVERING NEW ANTIBACTERIAL AGENT

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Tagetes genus contains 56 species which most of them are annual and perennial herbaceous plants in the sunflower family (Asteraceae or Compositae). This genus is native in North and South America, but some species have become widespread around the world. *Tagetes erecta*, the Mexican marigold, also called Aztec marigold, is a species belong to the genus *Tagetes* native in Mexico and Central America. Despite its being native to the America, it is often called African marigold. In Mexico, this plant is found wildy in the states of San Luis Potosí, Chiapas, State of México, Puebla, Sinaloa, Tlaxcala, and Veracruz. This plant reaches heights of between 50–100 cm. The Aztecs gathered as wild plant and as well as cultivated for medicinal, ceremonial and decorative purposes. It is widely cultivated commercially with many cultivars for use as ornamental plants. This study was designed to examine in vitro anti-bacterial potential of methanolic and ethanolic extracts of *T. erecta*. Hydro alcoholic extracts from aerial parts of this plant were prepared using aqueous solution of ethanol and methanol (8:2 v/v). The inhibitory effect of these extracts was tested against clinical bacterial isolates including 3 Gram positive bacteria: *Bacillus cereus*, *Staphylococcus aureus* and *Staphylococcus epidermidis* and 5 Gram negative bacteria: *Salmonella Typhi*, *Kelebsiella pneumonia*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Proteus mirabilis*. For this purpose, disc diffusion method was used at 1.5, 3, 6, 12 and 18 mg of effective dose per disc and the zone of inhibition around each disc was measured (mm). Minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of these extracts were also investigated. Both extracts of *T. erecta* were active against *B. cereus*, *S. aureus*, *S. epidermidis* and *S. Typhi*. Hydro-alcoholic extracts of *T. erecta* showed significant antibacterial effect against some clinically important pathogenic bacteria. From these results it can be concluded that these extracts can be used as antibacterial agents in treating infectious diseases. Further studies are needed to be done for considering this plant as an antibacterial plant and have clinical application for routine use.

STUDY ON EFFECTS OF MEDIA AND FERTILIZERS ON YIELD OF ALOE VERA

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An investigation was carried out to study the effect of some media and fertilizers on yield and yield components of Aloe vera in Saveh. Media consist of: 1- Pure sand, 2- 50% pure sand + 50% decayed sheep manure, 3- 50% cocopeat + 50% pure sand, 4- 50% loamy soil + 25% pure sand + 25% decayed sheep manure. Fertilizers consists of: 1- 0% (no fertilizer), 2- Complete fertilizer (13-40-13) 20g/square meter, 3- NO_3NH_4 (Amonium nitrate) 15g/ square meter. Completely randomized blocks design with 12 treatments and 4 replications for any treatment was implemented. One 4 months old Aloe plant was planted in one pot with 5 pots in any replication in February and were placed in plastic greenhouse and later in outdoor in late May. In any media 3 kinds of fertilizers were used separately. After 6 months Aloe plants were isolated and these parameters measured: Gel rate, refuse (remainder of plant after gel isolation), fresh leaf weight, dry leaf weight. The effects of media on following parameters are significant in 1% levels and as follows: 1- The effect of media on gel rate was significant in 1% level and pure sand + manure medium had most gel production (48.81g). 2- The effect of media on fresh leaf weight was significant in 1% and pure sand + manure had most production (100.61 g). The effect of fertilizers on following parameters is significant in 5% level and as follows: Complete fertilizer had most gel production (930.26g) and most fresh leaf weight production (69.94g). There was no significant difference in 1% level in interaction between media and fertilizer on gel and fresh leaf weight production.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



OPTIMIZING THE EXTRACTION OF METHANOL EXTRACTS OF BARBERRY FRUITS

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Barberry fruit has high antioxidant activity and is useful in the treatment of asthma, angina, fever infections, lung disease, gallbladder disorders and it is used to lower blood triglycerides and also as astringent and antiseptic [1]. In this study optimizing methanol extraction of *Berberis vulgaris* by ultrasonic method was assessed. For process optimization, different times (5, 15, 25 min), amplitudes (40, 70, 100), solution to solid ratios (20, 35, 50) were tried. At the optimum operating condition (amplitude 100, solution to solid ratio of 50, 15 min of extraction) the process yielded 123.06 mg of phenolic compounds per gram of initial powder which was higher than the value obtained from methanol extract without ultrasound treatment and the difference was significant.

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PHYTOCHEMICAL INVESTIGATION OF *ANTHEMIS HUSSKNECHTI*

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Anthemis is the second largest genus in compositae. The genus *Anthemis* is represented by 130 accepted taxa and is known to contain sesquiterpen lactones and flavonoids. Sesquiterpene lactones, acetylenes and essential oils have been reported as the main classes of the secondary metabolites in genus *Anthemis*.

Although the Anthemideae is one of the chemically most studied tribes of compositae; to the best of our knowledge; flower and other parts of *A. hussknechti* was not a subject of research up to now. The flowers of *Anthemis hussknechti* were collected on the mountain Sanandaj in Iran; in June 2011. Voucher specimen is deposited in the Institute of Botany of Sanandaj (Herbarium BEOU; No 2531). Dried and finely powdered flowers (1000 g) were extracted three times (60 hr) with EtOAc (5 L) at room temperature for ten days. After filtration, the solvent was removed under reduced pressure to yield a residue (48 g) which was chromatographed on a silica gel column eluted with (n-hexane) with increasing amounts of crude extract. The crude extract (4.2 g) was fractionated by column chromatography on the silica gel column eluted with (n-hexane) with increasing amounts of Chloroform and EtOAc and MeOH fractions being collected as follows; (C₆H₆) and (C₆H₆:CHCl₃, 9:1); (C₆H₆:CHCl₃, 8:2); (C₆H₆:CHCl₃, 7:3); (C₆H₆:CHCl₃, 1:1); (C₆H₆:CHCl₃, 3:7); (CHCl₃); (CHCl₃:EtOAc, 9:1); (CHCl₃:EtOAc, 8:2); (CHCl₃:EtOAc, 7:3); (CHCl₃:EtOAc, 1:1); (CHCl₃:EtOAc, 3:7); (CHCl₃:EtOAc, 9:1); (EtOAc); (EtOAc:MeOH, 9:1); (EtOAc:MeOH, 1:1); (MeOH).

The structures were mainly deduced from extensive 1D and 2D NMR spectroscopy and FT-IR spectrometer.

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Kish Island



EFFECT OF DIFFERENT CONCENTRATIONS OF THYME ESSENTIAL OIL ON POSTHARVEST LIFE OF CARNATION (*DIANTHUS CARYOPHYLLUS* L.)

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The global trade in cut flowers has been evaluated at around US\$5.5 billion in 2004 and carnation (*Dianthus caryophyllus* L) is one of the top 10 cut flowers [1]. Short post-harvest life is one of the most important problems on the cut flowers [3,6]. Different compounds such as: aminoethoxyvinylglycine (AVG), aminooxyacetic acid (AOA) [11], 1-methylcyclopropene (1-MCP), silver thiosulphate (STS) [4], 2-aminoisobutyric acid (AIB) [7], Aminotriazole [9], cobalt [10], 8-hydroxyquinoline sulphate (8HQS) [5] and etc have been examined for delay of senescence and extension of vase life in carnation and other cut flowers. Some of these present chemicals compounds have problems in practical use and expenses. Meanwhile some of them such as: STS, AOA, 8HQS and aminotriazole can be harmful for health [3,8]. Thus searching to obtain of suitable natural compounds as alternative source instead of this chemical compounds, is essential for improvement post-harvest life of horticulture productions and overcome to induced bio-environmental problems by these compounds. Essential oils are used as medicinal, antimicrobial, antioxidant substances and ect [2]. Thus the aim of this study was to determinate the effect of thyme essential oil (TEO) on vase life of carnation. Two experiments were done for this study. Treatments include control (distillation water) and concentrations 250, 500 and 1000 ppm of TEO for the first experiment and concentrations 0, 50, 100, 150 and 200 ppm of TEO for the second experiment. Results showed that concentrations up to 250 ppm of TEO decreased the vase life at both cultivars of carnation. In lower concentrations, Beaumonde cultivar had a weak reaction than TEO in vase life, while application of 200 ppm of TEO significantly extended longevity in Sensi cultivar by 2.34 days. Also the relative fresh weight and total solution uptake for both cultivar, relative extension of flowers for Beaumonde cultivar and content of anthocyanin in Sensi cultivar were not affected significantly by treatments. Concentrations 50 and 200 ppm of TEO in Sensi cultivar had a positive relative extension of flower (diameter of flower) and showed significant different than control. 200 ppm TEO increased the anthocyanin in Beaumonde cultivar significantly. Diameter of flowers as index for extension or rolling had a significant positive correlation with vase life in both cultivars. Correlation of vase life with relative fresh weight and total solution uptake were positive and insignificant; also there are insignificant negative correlations between fresh weight and solution uptake in both cultivars.

PHYTOCHEMICAL AND ANTIOXIDANT ACTIVITY OF *FERULA GUMMOSA* BOISS. IN RAZAVI KHORASAN PROVINCE

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Ferula gummosa Boiss. (Apiaceae) with locally known as (Barije) is one of the most important mountainous steppe medicinal plants, which has been used in traditional medicine as antiseptic, anti spasmodic, anti inflammatory, anti convulsant, epilepsy and analgesic [1,2]. In this research due to study of the relationship between the most important secondary metabolites content (phenol, flavonoid) and their antioxidant activity in plant, the roots of *Ferula gummosa* were collected of Firozeh Neishabour mountainous village in vegetative period (late of July 2011), then dried and were extracted by water solvent. Total phenolics (TP) and total flavonoid (TF) content were determined spectrophotometrically and their antioxidant activity were measured by Total Antioxidant Capacity (TAC) method. The findings of phytochemical indicated that the TP contents had $8.566 \pm 0.08 \text{ mg GAE g}^{-1}$ and TF contents were $7.043 \pm 0.6 \text{ mg QUE g}^{-1}$. Antioxidant activity (IC50) was measured $1657.44 \pm 0.38 \text{ mg/ml}$. Therefore analyses of these results showed that there was a positive correlation between antioxidant activity and secondary metabolites content, because the water extract of *F.gummosa* with the lowest content of TP and TF compound had no good antioxidant activity, so we offer to research about investigation effect of various solvent in release of secondary metabolites in different parts of *F.gummosa* and survey of their effects in *in-vivo* and clinical models.

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EFFECT OF PELLETED ANIMAL MANURE AND UREA AND MICROELEMENTS ON OIL CONTENT AND COMPONENTS AND ACCUMULATION OF ELEMENTS AND CHLOROPHYLL IN PUMPKIN

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This study to examine the effects of animal manure and Urea as pellet and microelements on oil content and components and Accumulation of Elements and Chlorophyll in pumpkin (*cucurbita pepo var styriaca*) was conducted. The animal manure and Urea as pellet with four levels (150 Kg Urea (not pellet), 50 Kg Urea+3.5 tone animal manure, 100 Kg Urea+1.5 tone animal manure and 150 Kg Urea+1.5 tone animal manure) as main factor and microelements with three levels (1000, 2000 and 3000 ppm) including Iron and Zinc as minor factor were considered. The analysis of variance showed that in oil content and Iron and Zink accumulation in seed and biomass, there are significant differences among levels of main and minor factors. Results showed that the highest amounts of oil content belong to treatments of 3.5 tone animal manure+50 Kg Urea as pellet and 2000 ppm of microelements (45.14% and 46.56% respectively). The GC-analysis result showed, in 3.5 tone animal manure+50 Kg Urea as pellet with 3000 ppm of microelements had highest (88.64%) amount of unsaturated fat. The highest amounts of linoleic acid (56.86%) and oleic acid (34.28%) were obtained from 1.5 tone animal manure+150 Kg Urea as pellet with 2000 ppm of microelements and 3.5 tone animal manure+50 Kg Urea with 1000 ppm of microelements. The highest amounts of palmitic acid (11.57%) and stearic acid (2.23%) were obtained from 150 Kg Urea with 2000 ppm of microelements and 150 Kg Urea with 3000 ppm of microelements. In seed and biomass the highest amounts of Iron accumulation (35.93 and 15.36 mg/100 g respectively) belong to treatments of 1.5 tone animal manure+150 Kg Urea as pellet. In the levels of microelements, the highest amount of Iron accumulation in seed and biomass (30.78 and 15.1 mg) was obtained from 3000 ppm. The highest amounts of Zinc accumulation in seed and biomass belong to treatments of 1.5 tone animal manure+150 Kg Urea as pellet and 3000 ppm of microelements. The result of chlorophyll showed that in early stage, treatment of 150 Kg Urea had highest amount of chlorophyll accumulation in leave (43.16), while in final stage most severe of reduction rate of chlorophyll index was belong to same treatment. In final stage the highest amount of chlorophyll accumulation (27.57) was related to 1.5 tone animal manure+150 Kg Urea as pellet. As conclusion using animal manure and Urea as pellet, without losing oil yield, the aim of reduction of Urea consumption can be achieved. Using animal manure as pellet has provided more available nitrogen and this caused more amount of chlorophyll as proper index of photosynthesis.

EVALUATION OF MORPHOLOGICAL AND PHENOLOGICAL DIVERSITY IN IRANIAN FENNELS

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Fennel (*Foeniculum vulgare* Mill.) is one of the oldest herbs belongs to the Apiaceae family, is native to Mediterranean regions, a biennial or perennial herb up to two meters high, and has feathery leaves and golden yellow flowers. Fennel is used for various purposes in the food, cosmetic, and medical industries. In this study fifty ecotypes of Fennel (*Foeniculum vulgare* Mill.) from different part of Iran were collected and their morphological and phenological traits in two years were studied. The principal component analysis was conducted. The principal component analysis showed in first year 59% and in second year 57% of variance was counted by two first components that based on these two components, the ecotypes were comprised. ecotypes of Sari, Kaleibar, Qazvin, Chahestan and Haji abad long term (250 days), ecotypes Moqan, Kohin, Meshkin shahr, Alamot, Khalkhal, Damavand, Ardabil, Marvdasht, Kashan, Givi, Khash and Fozve are middle term plants (180 days), while the remaining ecotypes were short term plants (120 days), phenological traits are affected by climate, so that those ecotypes originated from regions with long proper condition long term, and those ecotypes originated from regions with short proper condition are short term plant. Ecotypes of Meshkin shahr, Ardabil, Tafresh, Sarpolezahab and Kaleibar have highest viability (80-96%). ecotypes of Sanandaj, Hasht gerd, Shabestar, Tafresh, Tehran and Mahalat have highest weight of 1000 seed (6-7.2 g). Ecotypes of regions with durable and favorable temperature and humidity have low weight of 1000 seed (because of high vegetative growth and number of flower) and high viability (because of existence of proper condition) and vice versa like ecotype of regions with unfavorable temperature and humidity have high weight of 1000 seed and low viability (like Tehran and Mahalat). Those ecotypes like Tafresh with high viability and weight of 1000 seed have suitable power of weed control and acceptable seed and essential oil yield, in addition high weight of 1000 seed is meaning more power to emerge in deep planting (in dry farming). As average in two year, ecotypes with higher seed yield than 500 g/m² including Moqan, Meshkin shahr, Alamot, Fozve, Fasa and Khalkhal (910, 881, 543, 542, 534, 528 g respectively). Finally regarding to present morphological and phenological diversity in Iranian fennels, we can say Iran has a one of most reach genetic reserves of fennel that this is primitive and main stock for breeders and selection programs.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF HYDROPRIMING ON GERMINATION AND EARLY SEEDLING GROWTH OF *DRACOCEPHALUM MOLDAVICA*

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In production of medicinal plants, seed germination as a very important problem. Seed priming is an efficient method for increasing of seed vigour and improvement of germination and seedling growth. The present study was conducted to investigate the effect of hydropriming on seed parameters of *Dracocephalum moldavica*. Treatments consisted of hydropriming level (6, 12, 18 and 24 hours) and unprimed control (0 hour) laid out in a completely randomized design (CRD) replicated four times. Results showed that all hydroprimed treatments were superior over unprimed treatment (control). The results showed that the effect of hydropriming was significant on germination percentage, germination rate, mean germination time, seedling length and seedling dry weight. There was no significant difference between hydropriming treatments. It can therefore be concluded that *Dracocephalum moldavica* seeds could be primed for at least six hours to obtained higher germination, emergence and growth on field conditions [1, 2].

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EFFECT OF SEED OSMOPRIMING ON GERMINATION AND SEEDLING GROWTH OF MILK THISTLE (*SYLIBUM MARIANUM*)

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Seed priming consists of imbibing seeds in an osmotic solution that allows pregerminative metabolism to proceed, but prevents radicle emergence. This treatment can increase rate, percentage and uniformity of germination or seedling emergence. The aim of this study was to investigate the effects of seed priming on germination and seedling growth of Milk Thistle. The experiment was conducted in petri-dishes using a factorial arrangement based on completely randomized design with three replications. Seeds of Milk thistle were osmotically primed in -1, -1.5 and -2 Mpa NaCl, KCl, KNO₃ and polyethylene glycol 6000 for 24, 48 and 72 hours at 20° C. Priming with all of the osmoticums increased germination percentage significantly. Seeds primed had higher germination rate, longer seedling length and greater seedling dry weight than non-primed control seeds. In this study increasing the duration of seed priming had negative effect on measured characteristics [1, 2].

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EVALUATION OF THE ANTIBACTERIAL ACTIVITY OF THE ESSENTIAL OIL FROM QARE-QAT ON PATHOGEN MICROORGANISMS

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In recent years, the use of food preservatives is inevitable to increase the shelf life, safety and quality of food. But food manufacturers and health authorities have a tendency to use natural preservatives due to adverse effects of artificial preservatives such as cancer, consumer response, expensive and time-consuming methods of food control systems on chemical preservatives. Medical plants can be one of the best choices for natural food preservative. They have the widespread use in traditional medicine, food and industry so we can use them as flavors and preservatives in the food industry. The Qare-qat, is one of medical plants that have long history in the treatment of some diseases in Iran and other countries and it has antimicrobial, phenolic, anthocyanin compounds that can be used to control the growth of pathogenic or spoilage bacteria, and inhibit the oxidation of necessary components in food. The purpose of this study is to evaluate the antibacterial activity of Qare-qat for using it as a natural preservative in food. Microbial infections are important challenges to health, and health care officials have major difficulties dealing with them especially regarding their antibiotic resistance. In this work, samples were prepared in different solutions such as water, methanol, ethanol and ether. The extracts of Qare-qat were extracted with succelle set. The antibacterial effects of essential oil were studied against *Staphylococcus aureus*, *Salmonella typhi*, and *E. coli* bacteria by digging hole and measuring diameter of growth inhibiting ring and the relevant dissolver were used as control and Gentamicine antibiotic was used for comparison. The results of study showed that Qare-qat has good antibacterial activity. So, it may be useful in inhibition of food poisoning disease. Thus, it seems necessary to use the beneficial effects of this plant in the food technology.

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GROWTH AND ESSENTIAL OIL YIELD OF BASIL (*OCIMUM BASILICUM L.*) AS AFFECTED BY FOLIAR SPRAY OF CITRIC ACID AND SALICYLIC ACID

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We investigated the effect of foliar application of three levels of citric acid (0, 0.1, and 0.3 % w/v) and three levels of salicylic acid (0, 2, and 4 mM) on leaf dimensions, SPAD reading, and yield indices (wet yield, dry yield and essential oil yield) of basil. The experiment was conducted in a randomized block design factorial arrangement (3×3), with four replications. Factorial analysis suggested both Citric acid and salicylic acid affecting only on essential oil yield. Essential oil yield for 0, 0.1 and 0.3 % w/v of citric acid was 42.9, 52.9 and 58.8 kg/ha respectively. Salicylic acid either had no effect or decreased the essential oil yield in 4 mM level. Essential oil yield was significantly higher than control in most factor-levels that contained citric acid. The highest essential oil yield was observed in citric acid 0.1% w/v + 0 mM salicylic acid with mean of 73.4 kg/ha compared to 39.5 kg/ha in control. The citric acid ease of availability and usage makes it a promising candidate in manipulation of secondary metabolism related pathways in medicinal plants.

GROWTH AND ESSENTIAL OIL YIELD OF DILL (*ANETHUM GRAVEOLENS L.*) AS AFFECTED BY FOLIAR SPRAYS OF CITRIC ACID AND MALIC ACID

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Effect of foliar application of three levels of citric acid (0, 1, and 0.3 % w/v) and three levels of Malic acid (0, 1, and 0.3 % w/v) on height, postharvest performance and yield indices (wet yield, dry yield and essential oil yield) of dill was studied. The experiment was conducted in a randomized design factorial arrangement (3×3), with four replications. Factorial analysis revealed that citric acid caused the incidence of powdery mildew to decrease significantly. Malic acid increased the plant height significantly. The combination of factors increased wet weight, dry weight, keeping quality characteristics of stored fresh dills and essential oil yield of dills comparing with control treatment. The possible mechanisms of action for these substances are discussed.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



COMPARISON OF CHANGES IN LEVEL OF MUCILAGE OF *PSYLLIUM SEED (PLANTAGO PSYLLIUM)* BASED ON VARIOUS EXTRACTION METHODS

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Plantago psyllium is a medical plant which is highly valuable and one of the important natural resources of Mucilage production in the world. The seed of this plant is rich in Mucilage which is used in both medical industry and traditional medicine. Thus, to determine the best method, three ways of mucilage had gone under a test to be compared at the end for maximum mucilage achievement in *Plantago psyllium*. This research was done completely randomized design for 3 extraction methods by 10 repetitions in laboratory of seed technology, Jihaad Daneshgahi Institute of medical plants in winter 2011. In the first method, the volume of solution containing mucilage was halved by heat. it was put in the refrigerator for 24 hours after adding alcohol and when passed through a filtering paper, it was exposed to the air for 24 hours to drain. In the second way, the volume of solution containing mucilage was kept in the refrigerator for 24 hours and after passing through a filtering paper was exposed to the air for 48 hours to drain. And by the third way, the Rotator was used to separate the mucilage from the solution. Due to an average comparison, all three ways had a meaningful difference of ($p < 0/01$). The result of variance analysis showed that applied treatments on the level of mucilage were meaningful. By applying the third method, the amount of mucilage was (weight percent 0.23420) and the minimum level of mucilage in the first way was (weight percent 0.11760). Comparison of all three ways illustrated that using the third method, not only causes a significant increase in mucilage but also saves the time and energy.

COMPARISON OF ACTIVE SUBSTANCES COMPOUNDS OF WORMWOOD (*ARTEMISIA ABSINTHIUM L.*) IN BOTH ACIDIC AND ALCOHOLIC EXTRACTS

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Wormwood plant (*Artemisia absinthium L.*) with long stems is one of the oldest medicinal and aromatic plants that belong to Asteraceae family. This plant is a grass, perennial, up to a maximum height of one meter and a mass in the arid lands, stony mountain slopes, along the road and goes up to 2000m altitude. Wormwood is native to temperate Asia and Europe and is found in northern regions in Iran. Properties such as Anti-helminth and insecticide due to bitter and aromatic compounds have been used in traditional medicine. Recently, researchers have reported the presence of analgesic in the wormwood plant [1]. In the first phase of the research study is to identify combinations of ingredients in this medicinal Plant and hoped that medical researchers can be use these results apply to the manufacture of Suitable generic drugs. In this study, aerial parts of wormwood plant grown in Hamadan's Garden Medicinal Plants (related Research Center of Agriculture and Natural Resources department) collected, washed and then dried and dry mass plant was grinding completely. Acidic and alcoholic extracts were prepared from powder samples of the using maceration method in 14 days. In acidic extracts, acetic acid 8% were used and ethanol alcohol used in another extracts. After filtering and evaporating the solvent, dried extracts obtained were chromatography using GC & GC MAS to identify compounds. The main components of a total of 100 compounds were identified in per extracts, mainly as follows: Inositol was highest in the acidic extract (24.13%). Then Sobrerol, Tetramethyl dihydro naphthalene compound and Chamazulen were in second place (Respectively: 5.11%, 3.95%, 2.49 %). Inositol in the alcoholic extract had the highest too (19.28%). Tetramethyl dihydro naphthalene compound (15.18 %), Tetramethyl ethyl dihydroindene compound (6.12 %), A cyclic compound [benzopyran] (3.26%) and Linoleic acid (2.60%) were ranked in Next. Differences in composition and amount obtained can be expressed as Two types of solvents used in the preparation of wormwood extract cause the release of specific and different compounds.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



FEIJOA SELLOWIANA AS A GOOD SOURCE AGAINST STAPHYLOCOCCUS AUREUS RESISTANT TO VANCOMYCIN

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Staphylococcus aureus is one of the most common human pathogens. The toxicity from antibiotics are generally used to treat bacterial infections must generally be considered. An alternative way for treatment of bacterial infection is herbal therapy. *Feijoa sellowiana* (Pineapple Guava) is grown for edible fruits, in this study, the antibacterial activity of different parts of *F. sellowiana* were investigated. A strain of *S. aureus* which was resistant to vancomycin was isolated from patients from Imam Hospital in Sari. Methanolic extracts of fruits, leaves and stems of *F. sellowiana* were provided, inhibition effect of this extracts on *S. aureus* were evaluated by disk diffusion and MIC agar dilution tests and compared with ampicillin, chloramphenicol and vancomycin discs as positive control. Inhibition zones of extraction on *S. aureus* were (15-20 mm). The MIC and MBC of extracts of *F. sellowiana* on *S. aureus* were 15-22µg/ml. This plant showed high activity against vancomycin and lower antibacterial activity showed in comparison with standard antibiotics like ampicillin and chloramphenicol. Methanolic extracts of different parts of *F. sellowiana* significantly fruits demonstrated inhibition effect on *S. aureus*, and inhibition ability of these extracts could compare with vancomycin.

STUDY THE EFFECT OF THREE MEDICINAL HERB KINDS AS THYME, FENNEL, AND SPEARMINT IN HEALTH AND CURE OF ANIMAL AND BIRDS

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According to the statistics of world health organization (WHO) more than 80 percents of world people particularly in the under developed countries and poor, far away districts provide their main cure requirements from medicinal herbs. The side-effects of chemical drugs for patient have more dangerous results in contrary to the illness itself. So, it's necessary to be more careful about their application. These effects caused the medicinal herbs gets vast and wide application. We use different chemical materials to increase the biological effective varied materials. He purpose of this study is, to introduce three medicinal herb kinds (Thyme, Fennel, Spearmint) that in Iran we use them more for health of animal and birds, to indicate their medicinal properties, botany and cultivation or planting regions and finally their effect on the health and cure of animal and birds. Thyme kind that grows in dry deserts, cold and semiarid climate or regions, we human and animal medicine as a cure for cough, Meteorism, Anti-Bacterial, Fungicide, Spasm and mouth wash. Also its Fungicide property prevents of spreading Aspergillus disease among the ostrich chickens (young ostrich). And the Fennel kind that grows in Mediterranean with spring rains and cold desert regions and semiarid climate has the medicinal properties such as gastric tonic, appetizer, tranquillizer, anti-stomachache-cordial, carminative and increase the animal milk. However, the animal husbandmen use it to improve and increase the quality and quantity (magnitude) of animals milk. Spearmint kind that grows Mediterranean, hot and dry desert and semiarid regions has the property for stimulation of central nervous systematic-convulsion and anti-diarrhoea. By using the Spearmint in dietary ration of birds, it will prevent the chickens death and its extract will cause the good flavor in chickens meat.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF SEED MOISTURE CONTENT DURING STORAGE ON GERMINATION CHARACTERISTICS OF (*OCIMUM BASILICUM* L.)

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Seed priming (controlled hydration followed by drying) is one of advanced seed treatment technologies in international and is used to improve seedling emergence. However seed priming can also reduce the longevity of seeds during dry storage. Moreover water is one of the most important factors determining seed storage stability. The objective of this study was to compare seed viability between primed and unprimed seeds during storage. In order to evaluate the effects of seed moisture content during storage on germination characteristics of primed and control (not primed) Basil seed *Ocimum basilicum* L. seeds, a factorial experiment based on a completely randomized design with three replications was carried out at Faculty of Agriculture, Mashhad Branch, Islamic Azad University, during 2011. Seeds were primed (12 h at 25 C in -1.2MPa KH_2PO_4 solution followed by rinsing and drying). Water content of primed and unprimed seed was adjusted to (5%, 10%, 15%, 25%) by using saturated salt solution of ZnCl_2 , $\text{Ca}(\text{NO}_3)_2$, KCL, KH_2PO_4 . Both primed and control (not primed), were stored at 25 C for 12 days at incubator. The results indicated there was significant difference between primed and unprimed Basil seed. Unprimed seed possessed more germination rate, germination percent and shoot length, than primed seeds. Also results showed with increase in seed water content, germination characteristics such as germination percent and germination rate, decreased. Minimum germination rate, germination percent was at 25% seed water content. This data supports previous reports that primed seeds deteriorated faster than unprimed seeds during storage [1, 2, 3, 4].

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EFFECT OF GA₃ AND CHILLING ON THE SEED GERMINATION OF *ARCTIUM LAPPA* L.

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Common Burdock is a biennial plant that is used in herbal medicine, cosmetics products and food. Burdock is propagated by seed but its germination due to dormancy is erratic. In this study, we investigated the influence of different level of cold stratification (0, 1, 2, 3 and 4 weeks) and application of various concentrations of GA₃ (0, 100, 250, 500 and 1000 ppm) and their combination on burdock germination. Result showed different levels of cold and GA₃ had significant effect on percentage and rate of germination. The highest percentage and rate germination was obtained by application of 1000 ppm of GA₃. Germination significantly was increased by seed chilling at 4°C for one week. The increasing chilling period decreased the germination. Maximum germination was achieved at combination treatment cold stratification (1 week) with 1000 ppm of GA₃ whereas at 4 weeks chilling, without application of GA₃ minimum germination was observed. This result can be referred to physiological dormancy in burdock.

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THE *IN VIRTO* LIPASE INHIBITORY ACTIVITY OF GREEN TEA EXTRACT

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Obesity is one of the major health problems and is associated with the serious chronic diseases such as cardiovascular diseases and diabetes. Orlistat, a lipase pancreatic inhibitor, is the most common anti-obesity drug. Pancreatic lipase is the most important enzyme in digestion lipids. Green tea (*Camellia sinensis*) has been recognized for promoting healthy and body weight control. In this study, we evaluated ability of green tea to *in vitro* inhibit porcine pancreatic lipase (PPL) activity. Hence, we analyzed different concentrations (0.06, 0.12, 0.25, 0.5, 1, 2, 4, 6, 8, 10, 20, 30, 40 µg/ml) aqueous and 70% ethanolic dry extract. We used para-nitrophenyl palmitate (pNPP) as substrate to assay of lipase activity. The result indicated that PPL noticeably inhibited by ethanolic green tea extract, correlated by concentration. Highest inhibited PPL activity observed at concentrations 40 and 30 µg/ml of ethanolic extract by 60.5% and 56.5%, respectively. Aqueous extract was less inhibitory effect on the PPL than ethanolic. It exhibited 23.43% inhibitory PPL activity at 40 µg/ml. It is concluded ethanolic green tea extract is a rich source of anti-lipase compound.

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THE EFFECT OF SEED SIZE ON THE QUANTITY AND QUALITY OF ESSENTIAL OIL OF *PIMPINELLA AUREA* FROM THREE LOCALITY IN TEHRAN PROVINCE

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Pimpinella aurea is one of the most common *Pimpinella* species in Iran that is distributed at North West, west, center, east north and south east of Iran. This species is aromatic and contains essential oil with antimicrobial effect. In this research, for study of the effect of seed size on essential oil content and composition of *Pimpinella aurea*, seeds were collected from three localities in Tehran province (Tochal, Vardavard and Lavasanat) and after drying were separated by sieves of 20, 25 and 30 meshes. All samples were subjected to hydro-distillation, individually, for obtaining their essential oils. The mean oil yields for Tochal seeds were 4.01%, 3.20% and 1.12% for 20, 25 and 30 meshes, respectively. These values were 5.69%, 3.20% and 1.94% for samples from Vardavard and 3.21%, 2.70% and 1.85% for Lavasanat samples. The results showed with decreasing the seed size, the oil yield decreased remarkably. The essential oils were analyzed by GC and GC/MS for identification of their chemical composition. The main compound in all oils was β-Bisabolene (57.2-83.6%). The other major component was epoxy allo-Aromadendrene (3.9-30.6%). The results showed seed size had not considerable effect on essential oil composition. The seeds were collected from Vardavard (more warm and dry habitat) contained more oil yield and β-Bisabolene content.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EVALUATION OF WATER STRESS AND HARVEST TIME ON QUALITATIVE YIELD AND MORPHOPHYSIOLOGICAL PARAMETERS ON PEPPERMINT (*MENTHA PIPERITA* L.) AS MEDICINAL PLANT

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Mentha x piperita is one of the most commercially important mint specie and peppermint oil is one of the most popular and widely used essential oils, mostly because of its main components, menthol and menthone. In Medicinal plant production the secondary metabolites are mainly the final aim of such plantation. Unlike the other common crops, in medicinal plants, abiotic stresses namely drought stress, can possibly change the bioactive constituents combination towards the production of pharmaceutically important compounds and as these molecules are the result of defending strategies by which such plants adapting themselves to unfavorable circumstances. An experiment has been carried out in a completely randomized design in three replications to investigate the effects of different levels of drought stress (25, 50, 75 and 100 mm of evaporation levels from a class A evaporation pan) and different harvesting times (initial flowering, full bloom and post flowering) of peppermints. The factors have been measured during this experiment was consisted of essential oil content, biological performance, commercial performance, harvesting index, leave area index, chlorophyll content and plant height. The single effect of irrigation proved significant effects of all irrigation treatments on all of the studied parameters except the essential oil content. It has also significantly influenced all of the measured parameters in different harvesting times. The cross effect of irrigation levels and harvesting times were significant in the entire studied factor except the commercial performance and leave area index. The highest essential oil yield with 142.68 kg/h and highest commercial performance with 1591 kg/h was measured in 25 mm of evaporation and the post flowering harvesting time, respectively.

IDENTIFICATION OF THE MOST IMPORTANT SECONDARY METHABOLITES OF SEED ESSENTIAL OF IRANIAN SHALLOT (*ALLIUM HIRTIFOLIUM* BOISS.)

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Iranian shallot (*Allium hirtifolium* Boiss.) is a one of the bulbous medicinal plant that belongs to Alliaceae family. It is native and endemic of Iran. Iranian shallot is a major component of many Asian diets and is widely believed to be beneficial to health. Leaves and bulbs are edible parts of plant. Iranian shallot is propagation with seed and bulb. Seed composition of essential was identified by gas chromatography mass spectrometry (GC/Mass) analysis. The results of this study showed the seed of Iranian shallot was containing sixteen essential components. The main and high amount of essential compounds were Thujyalcohol (27.85%), Pelargonaldehyde (Nonanal) (18.80%), Hexanal (10.65%), Camphene (6.53%), Benzoic acid, methyl ester (3.06%) respectively. In addition one of the most importants compounds in Alliums is sulfur compound such as Benzenesulfonamide, N-butyl- (1.11%) that found in essential seeds of Persian shallot between lower components.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



LEAF AREA ESTIMATION OF AJOWAN (*CARUM COPTICUM*) BY MATHEMATICAL EQUATION

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Leaf area is an important key factor for light interception, photosynthetic efficiency, evapotranspiration and plant growth. Leaf area measurement is difficult for medicinal plant of Ajowan with small leaves. There is an interest for measurement methods that are simple, quick and that will not measurement the leaf area. In order to establish equations to estimate leaf area (LA) by using total dry weight (TDW), specific leaf weight (SLW) and leaf weight ratio (LWR) of Ajowan, an experiment was conducted in the research farm of Ferdowsi University of Mashhad. Plant Samples were collected from the experimental area at different time intervals. The LA was measured using a leaf area meter. The LA was developed and validated with measured LA during different periods. Regression analyses of estimated LA versus measured LA showed that proposed equation ($LA=TDW * LWR/SLW$) provided accurate estimate ($R^2 = 0.84$, $n=50$) of Ajowan leaf area. Validation of the regression model showed that the correlation between measured and estimated values by the use of this equation was significant.

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ANTIMICROBIAL ACTIVITIES OF *MENTHA PIPERITA* L. ESSENTIAL OIL AGAINST
FOODBORNE PATHOGENS

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Mentha (commonly known as mint or pudina) is a well-known genus (family Lamiaceae) for medicinal and aromatic values. The genus *Mentha* includes 25-30 species. The antimicrobial efficacy of *Mentha* essential oils has been found to vary from moderate to significant often correlating with the composition of the oil. The objective of this study was to determine the chemical composition and antimicrobial properties of essential oil of peppermint (*Mentha piperita*). The chemical composition of the essential oil was analyzed by GC/MS and the antimicrobial activity of the essential oil on two gram-positive and two gram-negative pathogenic bacteria were determined by using disk diffusion agar, minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) method. Thirty-five components (99.66%) were identified in the oil. The major components of the essential oil were menthol, menthon and menthofuran with the concentration of 35.1, 17.48 and 11.66 %, respectively. Antimicrobial activity of the essential oil was examined against *Bacillus cereus* and *Staphylococcus aureus* as gram-positive bacteria and *Escherichia coli* 0157:H7 and *Enterobacter aerogenes* as gram-negative bacteria. In agar diffusion assay, peppermint showed inhibitory effects against all the examined bacteria except *Escherichia coli* 0157:H7. MIC was observed at 0.416, 0.052, 0.416 and 0.833 % (v/v), while, MBC was observed at 0.416, 0.102, 0.416 and 1.66 % (v/v), respectively.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ANTIMICROBIAL PROPERTIES OF *SATUREIA HORTENSIS* L. ESSENTIAL OIL AGAINST FOODBORNE PATHOGENS

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Satureja hortensis (Summer Savory or Garden Savory) is a well known, annual, herbaceous aromatic plant, native to Mediterranean region. The stem is erect, richly branching from the base and 30–60 cm high. The flowers are bisexual with purplish-pink color. The objective of this study was to determine the chemical composition and antimicrobial properties of the essential oil of *S. hortensis*. The chemical composition of the essential oil was analyzed by GC/MS and the antimicrobial activity of the essential oil on two gram-positive and two gram-negative pathogenic bacteria were determined by using disk diffusion agar and minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) methods. Twenty two compounds (99.89% of the total) were identified in the oil. The major components in the essential oil were carvacrol and gamma-terpinene with the amounts of 54.7 and 26.9 %, respectively. Antimicrobial activity of the essential oil was examined against *Bacillus cereus* and *Staphylococcus aureus* as gram-positive bacteria and *Escherichia coli* 0157:H7 and *Enterobacter aerogenes* as gram-negative bacteria. In agar diffusion assay, *S. hortensis* showed inhibitory effects against all the examined bacteria. MIC was observed at 0.052, 0.026, 0.026 and 0.026 % (v/v), respectively. Moreover, the MBC was observed at 0.104, 0.026, 0.052 and 0.026 % (v/v), respectively.

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EFFECT OF PLANT GROWTH PROMOTING RHIZOACTRIA (PGPR) ON GERMINATION PARAMETERS OF SWEET BASIL (*OCIMUM BASILICUM* L.) UNDER COPPER CONTAMINATION

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Recently, using plant growth promoting rhizobacteria (PGPR) highly recommended for better performance of seed germination process under abnormal environmental conditions [1]. Soil, air and water pollution with heavy metals such as (Cd), lead (Pb), copper (Cu) and so on, are considered as the most important challenges in agricultural system [2]. In many researches co-inoculation of PGPR and other rhizobacteria were evaluated. In many plants including medicinal plants these microorganisms have an ameliorating role at germination process under adverse conditions. Accordingly, this experiment was designed to evaluate the effect of PGPR on germination parameters of sweet basil (*Ocimum basilicum* L.) under Cu contamination. The experiment was arranged in factorial based completely randomized design with three replications. Copper nitrate at four levels (0, 30, 60 and 90 mg L⁻¹) and inoculation of PGPR including *Azotobacter* spp., *Azospirillum* spp., *Bacillus subtilis* and *Pseudomonas* spp. were the treatments. Some germination parameters such as germination percentage and rate, seed vigor index, root and shoot length and seedling length. Results of ANOVA indicated that Cu contamination significantly affected all mentioned traits. PGPR main effect was not significant for all mentioned parameters except for seed vigor index. However, interaction between PGPR and Cu was significant in terms of germination percentage and rate and length vigor index. According to mean comparison by slice method, PGPR inoculation had an ameliorating effect on germination percentage and rate reduction and length vigor index with increasing Cu levels. However, increasing Cu levels significantly reduced seedling fresh and dry weight, shoot and root length both in inoculated and non-inoculated treatments. Among studied parameters, germination percentage and shoot length were more sensitive to Cu contamination.

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COMPARATIVE STUDY OF INSECTICIDAL ACTIVITY OF PLANT EXTRACT *LAWSONIA INERMIS* AND TWO INSECTICIDE, IMIDACLOPRIDE AND PRIMICARB ON *RHOPALOSIPHUM PADI* L. UNDER LABORATORY CONDITION

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The bird cherry-oat aphid, *Rhopalosiphum padi* L. (Hem.: Aphididae) is an important pest of cereals. Different chemical pesticides have been used for controlling the pest till now, but application of chemical insecticides has many hazardous effects on human health and environment. As an alternative for conventional pesticides, in recent years, plant extracts have received much attention as pests control because of their insecticidal properties. In this research, the effect of aqueous, methanolic extracts of *Lawsonia inermis* using a modified Soxhlet apparatus and two insecticides, Imidaclopride and Primicarb on synchronous adult aphid of *Rhopalosiphum padi* L. was investigated. The bioassay experiments were conducted on same size barley leaves under 25±1°C temperature, %70±5 humidity and photoperiod (16:8) L: D by dipping leaf method. In this study the insecticide effects of the aqueous, methanolic extract of *Lawsonia inermis* on aphids have been detected; Different concentrations (resulting from the previous screening) was used for each extract in order to obtain mortality ranging between 25% and 75%. At least five concentrations were selected for the calculation of lethal doses. Each bioassay consisted of four replicates per concentration and controls treated with solution (Tween+methanol % 0/02) for plant extract treatment and distilled water alone for insecticides treatment in a complete randomized design. Mortality was determined 24 hours after treatment. The LC₅₀ values for the adult aphid of bird cherry-oat aphid were 429170 (375920-484610), 29/41(27/40 to 31/48) and 336/2 (327/76- 400/72) mg/l for extract of *Lawsonia inermis*, Imidaclopride and Primicarb respectively. Dosage-response gradient was 2.312 ± 0.366, 4.302 ± 0.636 and 3.315± 0.473 for *Lawsonia inermis*, Imidaclopride and Primicarb respectively. Based on the results, adult aphid are more susceptible as compared with insecticides Imidaclopride. Between plant extracts, *Lawsonia inermis* has comparatively more effective and regard as plant extract property it is a suitable candidate for replacing it with synthetic pesticides.

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IDENTIFICATION OF SOME MEDICINAL PLANTS OF MARAGHEH REGION, EAST AZERBAIJAN PROVINCE (NORTHWESTERN IRAN)

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Maragheh is located on the west south of the Eastern Azerbaijan Province. It lies in Southern slope Mount Sahand, on the bank of the river Sufi Chay. As a consequence of such characteristic, it possesses a great variety of diversity of plant species. The research project of collection and identification of medicinal plants of Maragheh district was studied during 2008-2010. There were various stages contained collection of rural and local information about medicinal plants, field and in situ investigation, collection of herbal samples and identification of them. Some information including scientific name, family name, Persian name, local name, habitat, utilized organ(s), life form, distribution area and the height from sea level, etc. were recorded for each medicinal plant. The study presents data on 151 species belonging to 40 families. The predominating botanical families are *Asteraceae* and *Lamiaceae* with 23 and 18 species respectively. Hemicryptophytes (49.3%), and Therophytes (29.3%) are the most important life forms of studied area. Furthermore, shoots (29.1%) and flowers (25.9%) were the main plant parts used. The results of this study showed the region has a great potential for producing medicinal plants.



COMPARATIVE STUDY OF INSECTICIDAL ACTIVITY OF PLANT EXTRACT *RUBIA TINCTORUM* L. AND TWO INSECTICIDE, IMIDACLOPRIDE AND PRIMICARB ON *RHOPALOSIPHUM PADI* L. UNDER LABORATORY CONDITION

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The bird cherry-oat aphid, *Rhopalosiphum padi* L. (Hem.: Aphididae) is an important pest of cereals. Different chemical pesticides have been used for controlling the pest till now, but application of chemical insecticides has many hazardous effects on human health and environment. As an alternative for conventional pesticides, in recent years, plant extracts have received much attention as pests control because of their insecticidal properties. In this research, the effect of aqueous, methanolic extracts of *Rubia tinctorum* using a modified Soxhlet apparatus and two insecticides, Imidaclopride and Primicarb on synchronous adult aphid of *Rhopalosiphum padi* L. was investigated. The bioassay experiments were conducted on same size barley leaves under 25±1°C temperature, %70±5 humidity and photoperiod (16:8) L: D by dipping leaf method. In this study the insecticide effects of the aqueous; methanolic extracts of *Rubia tinctorum* on aphids have been detected; Different concentrations (resulting from the previous screening) was used for each extract in order to obtain mortality ranging between 25% and 75%. At least five concentrations were selected for the calculation of lethal doses. Each bioassay consisted of four replicates per concentration and controls treated with solution (Tween+methanol % 0/02) for plant extract treatment and distilled water alone for insecticides treatment in a complete randomized design. Mortality was determined 24 hours after treatment. The LC₅₀ values for the adult aphid of bird cherry-oat aphid were 376440(330670 to 427030), 29/41(27/40 to 31/48) and 336/2 (327/76- 400/72) mg/l for extract of *Rubia tinctorum*, Imidaclopride and Primicarb respectively. Dosage-response gradient was 2.532 ± 0.386 ,4.302 ± 0.636 and 3.315± 0.473 for *Rubia tinctorum*, Imidaclopride and Primicarb respectively. Based on the results, adult aphid are more susceptible as compared with insecticides Imidaclopride. Between plant extracts, *Rubia tinctorum* has comparatively more effective and regard as plant extract property it is a suitable candidate for replacing it with synthetic pesticides.

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COMPARATIVE STUDY OF INSECTICIDAL ACTIVITY OF THREE PLANTS EXTRACTS
FUMARIA PARVIFLORA LAM. *TEUCRIUM POLIUM* (L.) TAUSCH AND *LAWSONIA INERMIS* L. ON
APHIS GOSSYPII G. UNDER LABORATORY CONDITIONS

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Aphis gossypii is one of the most common insect pests attacking a wide spectrum of economic plants, causing great losses in their yield. A different chemical pesticide has been used for controlling the pest till now, but application of chemical insecticides has many hazardous effects on human health and environment. As an alternative for conventional pesticides, in recent years, plant extracts have received much attention as pests control because of their insecticidal properties. In this research, the effect of three aqueous, methanolic, extracts of *Fumaria parviflora*, *Teucrium polium* and *Lawsonia inermis* using a modified sukselsh apparatus on synchronous adult aphid of *Aphis gossypii* was investigated. The bioassay experiments were conducted on same size cucumber leaves under 25±1°C temperature, %70±5 humidity and photoperiod (16:8) L: D by leaf dip method. In this study the insecticide effects of the aqueous, methanolic extracts of *Fumaria parviflora*, *Teucrium polium* and *Lawsonia inermis* on aphids have been detected. Different concentrations (resulting from the previous screening) were used for each extract in order to obtain mortality ranging between 25% and 75%. At least five concentrations were selected for the calculation of lethal doses. Each bioassay consisted of four replicates per concentration and controls treated with solution (Tween+methanol % 0/02) for plant extract treatment in a complete randomized design. Mortality was determined 24 hours after treatment. The LC₅₀ values for the adult aphid of *Aphis gossypii* were 279078(201643 to 350824), 365376(288435 to 438652) and 388418 (305451- 461925) mg/l for extract of *Fumaria parviflora*, *Teucrium polium* and *Lawsonia inermis* respectively. Dosage-response gradient was: 2.68 ± 0.271 · 2.55 ± 0.416 and 2.49 ± 0.437 for *Fumaria parviflora*, *Teucrium polium* and *Lawsonia inermis* respectively. Based on the results, between plant extracts, *Fumaria parviflora* has comparatively more effective and regard as plant extract property it is a suitable candidate for replacing it with synthetic pesticides against *Aphis gossypii*.

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IN VITRO CALLUS, ROOT AND SHOOT INDUCTION IN *SCUTELLARIA PINNATIFIDA* AS
IRANIAN MEDICIN PLANT

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Scutellaria is a genus from Lamiaceae family with over 300 species [1] that extensively used as medicinal plant. *Scutellaria pinnatifida* is one of the 20 species that was grow and mentioned in Flora Iranica. This species with Persian name of "boshghabi" [2] is distributed in the northern of Iran that is known among people by medicinal properties to treat of various inflammatory diseases, hepatitis, allergies, cancer and atherosclerosis. Tissue culture is a technique to establish and propagate plant organs that could prepare materials with high amount of medicinal compounds. In this study, in order to finding suitable hormone treatments for induction of shoot, root and callus, several treatments were examined in *S. pinnatifida*. For this reason, seedlings germinated on filter paper were cut to hypocotyls and epicotyls and then explants were cultured on basal Murashige-Skoog medium [1962] supplemented with Kinetin to gather with one of α -naphthalene acetic acid (NAA) or 2,4-dichloro phenoxy acetic acid (2,4-D) in the range of 0- 2 mg L⁻¹. All treatments were done at least five replicate. Results after 30 days were showed that among NAA/Kin treatment, 0.5 mg L⁻¹ NAA was the best concentration for induction of numerous t root and leaf and also induction of highest shoot and extend leaf area was observed in this treatment. On the other hand, the most number of cali was obtained by 2 mg L⁻¹ Kin. Besides, among 2,4-D/Kin treatments, 0.5 mg L⁻¹ 2,4-D+2 mg L⁻¹ Kin and 1 mg L⁻¹ 2,4-D were the best hormonal treatments for induction of numerous callus and root formation on the root explant. Concentration of 2,4-D at 0.5 mg L⁻¹ with 1 or 2 mg L⁻¹ Kin were suitable for increasing number and length of the shoot generated in vitro condition. These treatments were induced callus with highest fresh and dry weight.

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ANTINOCICEPTIVE AND ANTISPASMODIC EFFECTS OF THE ESSENTIAL OIL OF *ARTEMISIA DRACUNCULUS* L.

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Tarragon (*Artemisia dracunculus*) is an important culinary herb generally used in mild-flavored egg and poultry dishes, mayonnaise, salad dressings, light soups, herb butter for vegetables, steak and grilled fish. It is a strong aromatic plant, and is also considered as a medicinal plant [1]. Tarragon has been used as a medicinal herb for several years in Iranian folk medicine for its antispasmodic and analgesic properties [2]. However, a bibliographical survey showed that there is no report on the analgesic and antispasmodic activity of the essential oil of this plant. Therefore, we decided to investigate the analgesic and antispasmodic activity of the essential oil of *A. dracunculus* (EOAD). The antinociceptive effect was assessed using chemical (formalin and acetic acid) and thermal (hot-plate) nociceptive tests. On the other hand, its antispasmodic effect was evaluated on isolated rat ileum [3-6]. The essential oil administration at doses of 30 - 300 mg/kg produced a significant antinociceptive effect in the formalin test, at 10- 300 mg/kg in the acetic acid- induced writhing test and at 100 - 300 mg/kg in the hot-plate test. Naloxone (2 mg/kg, s.c.) failed to antagonize antinociceptive effect of essential oil in the acetic acid- induced writhing test. Submaximal contractions induced by KCl or acetylcholine were concentration dependently inhibited by EOAD. The results suggest that the essential oil of *A. dracunculus* possess analgesic and antispasmodic properties that support the folk medicinal uses of this plant.

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EFFECT OF VERMICOMPOST ON SUPPRESSION OF *FUSARIUM* AND *PHYTOPHTORA*-INDUCED DAMPING OFF DISEASE IN *THYMUS VULGARIS*

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Damping-off and root rot diseases are frequent in medicinal plant field. Indiscriminate use of fungicides for disease control and their effect on the environment have influenced public interest in the search for natural innocuous products. This is especially important for greenhouse workers, who are continually exposed to harmful fungicides [1]. The physical and chemical properties of vermicomposts [2, 3] make them appropriate to be used as plant growing media [4] and disease suppressive substrates [5]. It is generally accepted that composts have the potential to provide biological control of plant diseases [6]. However, there has been little research on the use of vermicomposts for the same purpose. The aim of this paper was to evaluate a vermicompost suppressiveness in nurseries of *Thymus vulgaris* infested with *Fusarium solani* and *phytophthora*. Two assays were carried out: in one, infection with fungi performed before cultivation and in other experiment infection with fungi was 3 mounts after cultivation. The experiment was carried out in a greenhouse condition. Treatments were defined as follows: 0, 25, 50, 75 % vermicompost mixed with soil by volume. Seeds of *Thymus vulgaris* were sown in pots containing the different substrates. Seedlings with damping-off or incipient crown rot, as well as those that did not emerge as expected for the germination power, were considered diseased. Vermicompost's effectiveness in suppressing the disease depended on dosage. Vermicompost treatments significantly reduced the pre- and post-emergence damping off disease incidence under artificial infection with *F. solani* and *phytophthora*. The best protection to damping off disease was obtained by 50% vermicompost. The treatments gave the highest plant survival (%) and improved the growth parameters. Results showed that the levels of peroxidase and polyphenol oxidase activities highly increased in vermicompost-treated thyme plants compared in untreated plants.

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ANTIOXIDANT EFFECTS OF CURCUMIN ON HUMAN MESENCHYMAL STEM CELL

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Benzene is one of the toxic and hazardous air pollutants which are used as an industrial solvent and precursor in the production of drugs, plastics, synthetic rubber and dyes. Activation of benzene and its reactive metabolites such as hydroquinone leads to continuous production of reactive oxygen species (ROS), which damages DNA, RNA, and proteins. ROS formation can directly induce genetic changes and play an important role in many diseases. The production of benzene metabolites is followed by their transport to the bone marrow and other organs [1]. So bone marrow is one of the most important targets of benzene metabolites. Curcumin, the yellow pigment of *curcuma longa*, has been shown to possess potent antioxidant, antitumor promoting and anti-inflammatory properties in vitro and in vivo [2]. In this study we have investigated the protective effect of curcumin against hydroquinone-induced oxidative damage on human mesenchymal stem cells. Mesenchymal stem cells were isolated from human bone marrow and harvested. Cells were pretreated with curcumin, after 12 hours cells were subjected with hydroquinone for an additional 24 h. then ROS generation and lipid peroxidation – two important oxidative markers- were assessed and compared with the cells without pretreatment with curcumin. Lipid peroxidation was assessed by determining the level of thiobarbituric acid reactive substance (TBARS) in cell lysates and formation of intracellular ROS was measured using a fluorescent probe DCFH-DA. DCFH-DA is diffused into cells and the fluorescence intensity is proportional to the ROS levels within the cell cytosol. Significant decrease in TBARS and intracellular ROS was observed in cells with pretreatment with curcumin compared to cells without curcumin treatment. Thus the data shows that curcumin protects human mesenchymal stem cells against toxic and oxidative effects of hydroquinone.

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**HAIRY ROOT INDUCTION AND PLANT REGENERATION OF *NICOTIANA TOBACCOM* VIA
AGROBACTERIUM RHIZOGENES –MEDIATED TRANSFORMATION**

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Nicotiana tobaccum is a medicinal plant belongs to the Solanaceae family and contains some valuable materials such as nicotin and nornicotin that are frequently used in pharmaceutical industries. Hairy root culture produces high quantities of worthful secondary metabolites. Promoted hairy roots have several properties that are used for plant biotechnological applications. Their fast growth and easy maintenance and ability to synthesize medical compounds make them suitable system for in vitro production of secondary metabolites. since the induction of hairy root and production of regenerated Tobacco have higher amounts of secondary metabolites than untransgenic plants, this experiment was designed and explants of tobacco leaves were inoculated with some *Agrobacterium rhizogenes* strains such as A1,A2,A3. Inoculation Tobacco explants with strainA1 induced no hairy root but inoculated explants with A2 and A3 strains formed hairy root. Transformed plants had much more secondary metabolites that were statistically higher than control plants (at p<0.05).

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EFFECT OF HYDROGEN PEROXIDE ON GROWTH AND TAXOL PRODUCTION IN
SUSPENSION-CULTURED HAZELNUT (*CORYLUS AVELLANA* L.) CELLS

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Increasing lines of evidence support the idea that reactive oxygen species (ROS) function as signaling molecules that mediate responses to various stimuli [1]. Before the activation of *de novo* synthesis of secondary metabolites, the ROS production is also observed in elicitor-induced cell cultures [2]. Nevertheless, reports relating H₂O₂ from the oxidative burst to biosynthesis of second metabolites, have been contradictory, even with respect to experiments performed on the same plant species [3,4]. In the present work, the effects of H₂O₂ on growth and taxol production in hazelnut cells are investigated. Hydrogen peroxide concentrations were 13, 26 and 52 mM in culture medium. The cells were treated with hydrogen peroxide on day 8 of subculture and were harvested on day 14. Growth and biomass production, protein content, electrolyte leakage, total dissolved solute, pH changes and taxol (extracellular and cell-associated) accumulation were evaluated. Results showed that there was a significant difference between H₂O₂ concentrations on growth and biomass production in treated cultures and the parameters significantly decreased by 13 and 52 mM of H₂O₂, compared to that of the control cultures, although unaffected by 26 mM of H₂O₂. Medium pH was more alkalized under effect of 13 and 52 mM of H₂O₂ and electrolyte leakage, protein content as well as total dissolved solute also more enhanced by the concentrations and other H₂O₂ concentration (26 mM) actually had effect similar to control. Taxol production also affected by H₂O₂ and maximum content of total taxol (50 µg/g dry weight) observed under effect of 26 mM of H₂O₂. While highest cell-associated taxol achieved by 26 mM of H₂O₂, most extracellular taxol measured at 52 mM concentration of H₂O₂. Significant enhancement of taxol release was observed under 13 and 52 mM concentrations of H₂O₂, which were 71% and 67%, respectively. Present results indicated the effectiveness of elicitation by H₂O₂ on taxol accumulation in cell cultures of hazelnut. This is the first report of H₂O₂ elicitation on taxol production by cells of *C. avellana*.

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HERBAL SUPPLEMENTS MAY CAUSE DANGEROUS DRUG INTERACTIONS IN
ORTHOPAEDIC SURGERY PATIENTS

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Complementary and alternative medical (CAM) treatments such as herbal supplements have become increasingly popular in the United States. However, many of these products can have serious and potentially harmful side effects when combined with medications prescribed during and after surgery. Many herbal products are marketed as "natural" or "homeopathic," which may lead consumers to assume the products are safe, even when taken with prescription medicines, Dr. Rispler noted. "Herbal supplements can have a negative impact on patients both before and following surgery, and may interact with conventional medicines used to manage chronic conditions." Many of the most popular herbal supplements used today can have serious side effects when combined with prescription medicines. For example: Feverfew (used for migraine prevention), ginger, cranberry, St. John's Wort and ginseng can interact with the anti-clotting drug warfarin; Feverfew, ginger, and ginkgo can interact with aspirin; Garlic can interfere with anti-clotting medications and the immunosuppressant drug cyclosporine (prevents transplant rejection); Valerian (used as a sedative) can intensify anesthetics; and St. John's Wort can interact with immunosuppressive drugs and potentially lead to transplant rejection. Herbal products marketed for osteoarthritis also can pose serious risks when combined with prescription medications. For example: Glucosamine, chondroitin and flavocoxid can affect clotting agents; Black cohosh can interact with the cancer drug tamoxifen; and Cat's claw can interact with clotting agents, blood pressure medications and cyclosporine. Most surgery-related side effects can be avoided by stopping the CAM product at least one to two weeks prior to surgery and during the postoperative period while prescription medications such as blood thinners or antibiotics are being used. The problem arises when physicians do not know that a patient is using a CAM product, Dr. Rispler said. To help ensure physicians are aware of the products their patients may be using, Dr. Rispler also recommends including CAM product-use questions on health/medical assessment forms to encourage patient disclosure. "By opening up a conversation on the use of herbal medications around the time of surgery and compiling a complete list of all prescribed and self-prescribed medications and supplements, patients and physicians may be able to work together to decrease the risk of complications that can occur during and following surgery," Dr. Rispler said.

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National Congress on Medicinal Plants
16, 17 May 2012
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THE STUDY 2DE ELECTROPHORESIS OF SAFFRON (*CROCUS SATIVUS* L.) 'CORM AT FLOWERING STAGE

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Proteomics investigation was carried out on corm at flowering stage of saffron (*Crocus sativus* L.). Natural saffron is dried stigmas, and precious spice at market. Because of having many valuable substances e.g. crocin, it used as anti-tumor, anti-oxidant and anti-carcinogenesis. Saffron is a member of Iridaceae family and sterile plant. Nowadays biotechnology like proteomics helps to understand development and improvement of quality and quantity of this valuable crop. Saffron propagated by corms, the storage underground organs of saffron. The corm produces 7-9 tiny corms (cormlets) each year. The aim of these studies was identification of proteins which involved in saffron corm at flowering stage. The corms were collected from Research field of University of Tehran (Karaj). Proteins were extracted by using Damerval protocol, then the first dimensions isoelectric focusing (IEF) was carried out using Amersham recommended approach. The MS-spectrometry was carried out for identification of 12 spots from corm at flowering stage. The two identified proteins were, Mannose-binding lectin which was found in corm of saffron has anti-bacterial and anti-virus especially anti-HIV activities and also Glyceraldehyde-3-phosphate dehydrogenase, when the plant expose to any stress this enzyme produce at high level. To the best our knowledge, this is the first report on saffron proteomics.

Key words: Iridaceae, proteomics, *Crocus sativus*, Mannose-binding Lectin

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ANATOMICAL STUDY ON A NEW RECORD SPECIES OF *HYOSCYAMUS* L. (*SOLANACEAE*) IN KHORASAN RAZAVI PROVINCE

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Hyoscyamus kurdicus belongs to the family Solanaceae L., is an important medicine plants which reported for first time from Khorasan Razavi province. Its most important use is in relief of painful spasmodic affections of the unstriped muscles, as in lead colic and irritable bladder [1]. In present research, anatomical characteristics were studied based on cross section of stem. The results showed, thin epidermis layer, fairly wide cortex, wide pith with secondary xylem ring porous. Also, the arrangement of vessels were radial chain pore, clustered sometimes solitary [2].

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16, 17 May 2012
Kish Island



PREBIOTIC COMPOUNDS FROM MEDICINAL PLANTS, EXTRACTION, CHARACTERIZATION AND INHIBITION ON PATHOGENIC BACTERIA

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Prebiotics are defined as 'non-digestible food ingredients that beneficially affect the host by selectively stimulating the growth and/or activity of probiotic bacteria in the colon'. However, prebiotics also have health benefits that are not related to the simultaneous intake of probiotics. Inulin and fructo-oligosaccharides are among the most common prebiotics included in food ingredients, because of their technical (fat replacement, gelling) and nutritional ('bifidogenic') properties. Both are increasingly used in functional foods, especially in dairy and bakery products. In this research, prebiotic compound of some medicinal plants which grow naturally in Iran, including chicory roots and Jerusalem artichoke tubers were extracted and physico-chemical analysis of the properties of inulin powder was carried out. Growth promoting effects on a selection of probiotic bacteria from lactobacilli was investigated in combination with the extracted prebiotics, as well as their antimicrobial effects on certain human intestinal pathogens. The antimicrobial potential exhibited by each of the prebiotics used here appeared to depend on the carbohydrate source used. In conclusion, it has been revealed that the inhibition effects of probiotic strains on pathogenic bacteria was influenced by the prebiotic compounds extracted from the native medicinal plants and provided in vitro.

PROMOTING EFFECT OF INULIN ON THE SURVIVAL OF TWO PROBIOTIC *LACTOBACILLUS* STRAINS AT LOW PH CONDITION

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Probiotics are microbial food supplements that their consumption in specific amounts can lead to maintenance the microbial balance of gastrointestinal tract and health benefits thereof. Probiotics should be acid tolerant to survive through intestinal lumen and reach the colon to exert their effects. Therefore, some attempts like addition of prebiotics are made to improve their stress resistance and may result in suitable symbiotic pairs. In this study in vitro effects of inulin extracts from *Cichorium intybus* and *Helianthus tuberosus* was investigated on growth and viability of two probiotic strains, *Lactobacillus casei* and *Lactobacillus rhamnosus* at different pH values (2.5, 4 and 6.2) compared to glucose. Our results indicated that the inulin fructans, from different sources having various characteristics like reducing sugar, total ash content and degree of polymerization significantly extended the survival and viability of lactobacilli strains under acidic conditions.



RELATIONSHIP BETWEEN PEROXIDASE ACTIVITY AND SALT STRESS DURING PSYLLIUM SEED GERMINATION

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Germination of seeds, one of the most critical phases of plant life, is greatly influenced by salinity. Salinity adversely decreases the overall productivity of plants by changes in morphological, physiological and biochemical characteristics that cause reduced and delayed germination and poor stand establishment. Salt stress can stimulate formation of active oxygen species (AOS). In order to avoid these oxidative injuries, plants have developed enzymatic systems for scavenging these highly active forms of reactive oxygen species (ROS). Important enzyme that protects plant is peroxidase. *Plantago psyllium* is an important medicinal plant, generally grown in Iran, India and Pakistan. Its seeds contain 20 to 30% mucilage used by pharmaceutical companies in the treatment of chronic constipation, bowel cancer, amoebic dysentery, gastrointestinal irritation and it is very effective in reducing cholesterol level. In order to investigate of salt stress effect on germination of *psyllium* seeds, experiments were conducted at Center of Jihad-e Agriculture Education of Semnan. The experimental design was in a completely randomized design with six concentrations of NaCl and four replications. NaCl solutions were applied in 0, 30, 60, 90, 120 and 150 mmol/L concentrations. The results indicated significantly differences among levels of salinity for germination rate, germination percentage, mean germination time, dry weight percentage, seed vigor, decreases in germination percentage and peroxidase activity. Almost, the highest and the lowest amounts of characters were observed in 60 and 120 mmol/L, respectively. The results showed that salinity had critical effect on *psyllium* seeds germination indices and enzymes activities.

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PLANT REGENERATION OF *ARTEMISIA FRAGRANS* AND *ARTEMISIA SPICIGERA*

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The genus *Artemisia* is one of the largest and most widely distributed genera of the family Asteraceae [1]. The genus has received considerable attention as its members produce a wide spectrum of bioactive secondary metabolites that possess important pharmacological properties, including antitumor, antiviral, antimalarial, and anti-inflammatory activities [2, 3]. Since *Artemisia* species have come to be considered a valuable source of natural products, an increasing interest in biotechnological investigation of the genus has emerged over the past few years. This study was conducted for in vitro micropropagation of *Artemisia fragrans* and *Artemisia spicigera* using hypocotyl and cotyledon explants. The seeds of species were collected from wild populations growing in Azerbaijan province. The explants were cultured on Murashige and Skoog (MS) medium supplemented with different concentrations (0, 0.5, 1mg/l) of naphthalene acetic acid (NAA) and benzyladenine (BA) in combination together. The experiments were arranged using a factorial based completely randomized design with a minimum of 4 replicates. Summarizing across all treatments, the highest shooting induction of both species was observed on MS-medium containing 0.5 mg/l NAA and 0.5 mg/l BA. In the next steps, the shoots were transferred onto the MS media supplemented with different concentrations of NAA or Indole-3-butyric acid (IBA). Based on the results obtained, the best root induction on the shoots and regeneration of plants was achieved in presence of 1 mg/l IBA.

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National Congress on Medicinal Plants
16, 17 May 2012
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INVESTIGATING THE VARIATION OF RUTIN CONTENT IN *CAPPARIS SPINOSA* LEAVES AT DIFFERENT TIMES OF THE DAY

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Capparis spinosa L. (caper) (family Capparidaceae) is one of the most common aromatic plants growing in wild and dry region around the West or central Asia and the Mediterranean basin. Iran especially Tafresh is one of the natural inhabitant of *Capparis spinosa*. The plant is known for its medical and aromatic properties. It contains large numbers of secondary metabolites in particular, rutin [2]. The objective of this study was investigating the variation in rutin content in different time of the day in plant leaves. Mature leaves were collected in July from Tafresh at an altitude of 1890 m. The leaves were harvested for three successive days every five hours from 6 AM up to 9 PM. Laboratory study was conducted in botanical laboratory of saveh branch, azad university. The plant samples were air-dried in a good air draft in the absence of direct sunlight and then ground for 30 minutes. The extraction was performed by using a solvent containing (methanol-acetic acid-water) for one hour on a shaker at laboratory temperature then centrifuged for 10 min at 2000 rot/min. According to spectrophotometric method with $AlCl_3$ [1]. The supernatant diluted 50 times, then was added $AlCl_3$ 5% in methanol. After 30 minutes absorbance at 420 nm was measured in solution. According the experiment there wasn't any significant difference in amount of rutin during these three days. The lowest rutin concentration was measured in the morning and rutin content didn't vary markedly in the morning but there was an impressive increase in rutin content up to afternoon. High content of rutin was measured in the afternoon. Although rutin content decreased up to night but it was more than its content in the morning and it offers the best time for harvesting leaves.

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THE EFFECT OF LEAVES AQUATIC AND ALCOHOLIC EXTRACT OF *CANNABIS SATIVA* ON NEURONAL DENSITY OF HIPPOCAMPUS IN MALE RATS

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The Memory, create in effect of existence change in the hippocampus neuronal network [1]. In *Cannabis sativa* was found more than sixty one substance that cannabinoid was named. The aim of this study is the evaluation of leaves aquatic and alcoholic extract of *Cannabis sativa* effect on neuronal density of CA3 of Hippocampus in male rats. In duration of 45 days. This research is an experimental study that is done in Islamic Azad University Mashhad branch. Forty male Wistar Rats weight (300-350 g) were completely divided into four experimental groups and control group. *Cannabis sativa* was extracted with Soxhlet apparatus [2]. Aquatic and alcoholic extract was injected peritoneal (I.P.) in experimental groups with dosage. in 45 days. (50 mg kg^{-1} , 25 mg kg^{-1}) [3]. After 45 days, Animal was decapitated and their brain dissected, fixed in 10% formalin, sectioned in $7 \mu\text{m}$ thickness and stained by H.E. By applying dissector techniques and systematic random sampling scheme the neuronal density of CA3 of Hippocampus were estimated [4]. Then the numerical density in each group compare with control group whit use "T- test" statistics test and Minitab 13 software. Statistical analyses showed significant decrease ($p < 0/001$) in the CA3 of Hippocampus neuronal density in experimental group ($25, 50 \text{ mg kg}^{-1}$ Alcoholic) in compare with control group (in duration of 45 days). So with due attention to aquatic and alcoholic extract of *Cannabis sativa* leaves has decrease neuronal density in treatment groups ($25, 50 \text{ mg kg}^{-1}$). Injection of aquatic and alcoholic of this leaf in duration of 45 days doesn't have the neuroprotective effect.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF SOUR TEA (HYPOREX-B®) TABLET VERSUS CAPTOPRIL IN THE TREATMENT OF HYPERTENSION

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Herbal medicines such as olive leaves, garlic, and sour tea in particular have been traditionally prescribed to manage blood pressure. In this respect, this study has been targeted to evaluate the effect of sour tea tablet containing the herb's extract versus captopril in the treatment of hypertension. This cross-sectional clinical trial was conducted initially on 40 patients of more than 18 years old while those not meeting the criteria (also diabetic patient and those with heart failure) were excluded from the study and were advised for life style modification. The clients were randomly divided into sour tea and captopril groups to be covered within a six-week period of treatment. Sour tea tablet was prescribed at a dose of 500 mg twice daily, while captopril was given twice daily at a dose of 12.5 mg. In order to improve precision and final measurement, ABPM was done both prior to the study and after measuring the hypertension in two successive visits. The data were analyzed using Chi square, Fisher's exact and paired t tests. Of the 20 patients, 13 (65%) were male and 7 (35%) were female. No meaningful difference was detected in both groups in terms of sex, age, and job (P -value ≥ 0.05). Mean systolic blood pressure decreases were 7.75 ± 8.3 and 13.3 ± 16.1 mmHg in the captopril and sour tea groups, respectively (P -value > 0.05). Also, mean diastolic blood pressure decreases were 2.15 ± 4.14 and 5.8 ± 7.8 mmHg for the captopril and sour tea groups, respectively (P -value > 0.05). No side effects such as coughing, blood pressure fall, rising BUN, Cr, Na or K were observed for the sour tea tablet in the study. In sum, due to the effect of sour tea tablet in decreasing blood pressure without giving of course priority to it over captopril, sour tea tablet containing the herb's extract can be prescribed as an adjuvant therapy alongside the standard treatments in lowering the prescribed dosage for the patients.

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THE USE OF ESSENTIAL OILS TO MAINTAIN POSTHARVEST QUALITY OF POMEGRANATE FRUIT (*PUNICA GRANATUM L.*)

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In order to investigate the effect of Clove (*Caryophyllus aromaticus L.*) and thyme (*Thymus vulgaris L.*) essential oils on the storage life, qualitative and quantitative characteristics of pomegranate (*Punica granatum L.*), this experiment performed in factorial base on completely randomized design (CRD) with four replications. Factors examined include: Thyme essential oil (0, 100, 200 and 400 mg/l) and Clove essential oil (0, 100, 200 and 400 mg/l). At first Fruits dipping in different thyme essential oil concentrations for 5 min and then dried at room temperature for 10 hours. Then the fruits sprayed with Clove essential oil and dried for 5 hours at room temperature. The fruits were placed in the plastic bags and packed on special package separately. Treated fruits were stored under refrigerator condition (0-4°C and RH=75- 90%) for 4 month. At the end of experiment time, different parameters such as decay percentage, total solid solubility (TSS), pH, anthocyanin, vitamin C, weight loss and fruit juice density were measured. The results indicated that all qualitative and quantitative characteristics of pomegranate changed during the storage, but this changes were different depend on treatment. The results also showed that the type of the essential oil had significant effect on the fruits weight loss, decay, pH and anthocyanin. The use of Thyme essential oil was more effective on fruits weight loss and decay compared to Clove essential oil. In general, the use of essential oils can be improving the qualitative and quantitative characteristics of pomegranate fruits.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF ANTIREFLUX-B® SYRUP VERSUS OMEPRAZOLE AND RANITIDINE IN THE TREATMENT OF GASTROESOPHAGEAL REFLUX DISEASE

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Gastroesophageal reflux disease (GERD) is one of the most common diseases in GI tract as 15% of people in community have the same symptoms at least once a week. The aim of this survey was to investigate the effect of a herbal syrup (Antireflux-B®) containing extracts of Aloe vera in treatment of GERD in comparison with omeprazole and ranitidine. In a randomized clinical trial, 132 patients with GERD symptoms referred to gastroenterologist, enrolled to three groups: antireflux-B (10 ml before breakfast), omeprazole (one capsule 20 mg before breakfast) or ranitidine (150 mg, twice daily). In first visit, 2 weeks and 4 weeks after treatment the patients were visited upon clinical features. The data has been analyzed with Wilcoxon test, McNemar and paired T test. There was no significant difference between 3 treatment groups upon cross matching factors (age, gender, educational status, ...) ($P > 0.05$). The effect of antireflux-B, omeprazole and ranitidine on severity of reflux symptoms was 82%, 79% and 74% respectively. There was no significant differences upon relieving main reflux symptoms (heart burn, souring sensation, ...) in three groups ($P > 0.1$). The frequency of adverse effects were nearly similar in all groups. According to similar effects of three drugs in relieving the symptoms of GERD, the researchers were concluded that Antireflux-B syrup can be prescribed in patient with gastroesophageal reflux disease.

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ESSENTIAL OIL COMPOSITION OF *FRANCOEURIA UNDULATA* UNDER DIFFERENT ONTOGENESIS CONDITIONS

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An experiment was carried out to identify the effects of ontogenesis condition on the yield and essential oil composition on *Francoeuria undulata*. Aerial parts of *F. undulata* were harvested on pre-flowering, flowering and post flowering stages. Essential oil was obtained by hydro-distillation using Clevenger type apparatus during approximately 4 hours and analysed with GC and GC/MS. 20-29 components were identified in *F. undulata* essential oil at ontogenesis conditions, that represented 97.49% - 98.24% of the oils. The main components of the oil were Eudesma-4(15), 7-diene-1- β -ol (31.25-37.66%), 1,8-Cineol (18.99-26.49%), α -Terpineol (7.97-11.17%), α -Pinene (6.71-8.83%) and Terpinene-4-ol (4.73-6.98%). The results showed that ontogenesis conditions caused significant effects on essential oil composition in *F. undulata*. But not significant effect on essential oil yield.

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EFFECT OF M.G[®] LOTION VERSUS M.G[®] OINTMENT IN THE TREATMENT OF HEMORRHOID SYMPTOMS

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Hemorrhoids are common diseases of anorectal region and resulting from dilatation of the hemorrhoidal vein network that increased venous pressure continuously. The aim of this study was comparing the effect of M.G[®] lotion versus M.G[®] ointment on hemorrhoid symptoms. In a randomized double blind placebo controlled clinical trial, 100 patients with hemorrhoids enrolled in two treatment groups (M.G ointment with placebo lotion or placebo ointment with MG lotion) to apply one rectal applicator of ointment and imbue a piece of cotton with 10-15 drops of lotion and apply through rectum two times a day for two weeks. After that the patients were reevaluated for symptoms severity. The data has been analyzed with independent t-test, paired t-test and Mann-Whitney U test. There was no significant difference between two treatment groups upon cross matching factors (age, gender, educational status ...) (P >0.05). Also There was no significant differences upon relieving main hemorrhoid symptoms in two groups (P >0.1). According to similar effects of two drugs in relieving the symptoms of hemorrhoid, and easier application of MG ointment compared with MG lotion, the researchers were concluded that MG lotion can be prescribed in patient with hemorrhoid based on patient demand.

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ANTI-INFLAMMATORY EFFECT OF HYDROALCOHOLIC EXTRACT OF *NEPETA MENTHOIDES* AERIAL PARTS IN MALE MOUSE

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The application of herbal plants instead of synthetic drugs is increasing in recent Years because of their lower side-effects and high varieties of efficient components [1]. The study of anti-inflammatory and antinociceptive effects of hydroalcoholic extract of *Nepetamenthoides* seems to be necessary due to the existence of its anti-inflammatory components. This study has been done on 48 NMRI male mice of 20-25 g in weight. We used Xylene-induced ear edema for demonstrating its anti-inflammatory effects. In this test, the animals were divided into 6 groups (each group consisting of 8 mice): Sham, Positive Control (receiving dexamethasone at dose of 15 mg/kg test [2]), experimental groups receiving hydroalcoholic extract at doses of 70, 350, 700 and 1400 mg/kg. This study shows that *Nepeta menthoides* aerial parts has anti-inflammatory effect at all doses, particularly at dose of 1400 mg/kg (p < 0.05). The hydroalcoholic extract of *Nepeta menthoides* has anti-inflammatory effect and 1.8-Cineol component in this plant may be the reason of these effects [3].

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ASSESSMENT OF SOME ECOPHYSIOLOGICAL ASPECTS OF *BUNIUM PERSICUM* AS A VALUABLE AND ENDANGERED MEDICINAL PLANT

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Medicinal plants are used for diverse goals by the human since the ancient times. In recent years, these plants have attracted a great deal of scientific interest because of their unique properties. *Bunium persicum* or black cumin is an important medicinal plant from the *Apiaceae* family, especially grown in different regions of Iran. In the indigenous system of medicines, seeds are regarded as stimulants and carminatives and found to be useful in diarrhea and dyspepsia. Also, this plant is used for culinary purposes and for flavoring foods and beverages. Regards to the essential oil as the fundamental property of medicinal plants, It was reported that *B. persicum* seeds are rich in essential oil (up to 7%), and among the components, monoterpene aldehydes content are higher than the others. Generally, the main components black cumin seeds are cuminaldehyde, *p*-mentha-1, 3 dien-7-al and *p*-mentha-1,4-dien-7-al; terpene hydrocarbons (α -terpinene, *p*-cymene, β -Pinene). The latter compounds are thought to reduce the quality of the spice. During recent years, *Bunium persicum* forced to the endangered plants group because of various reasons, but mainly as a consequence of overutilization, unscientific and commercial extraction of seeds obtained from wild habitats. The competition for collecting the seeds is so severe that, instead of collecting the ripe seed in its habitat, the entire plant is removed even when the seeds are immature. The ecological and physiological properties of plant is somehow ambiguous, because of restrict researches related to the plant. The base temperature of plant is estimated between 0.35 to 4.14 °C, according to the ecotype. It was also reported that cold stratification is the best treatment for dormancy breaking of seeds, which limit the plant establishment. Results of the evaluation of plant habitats indicated that *Bunium persicum* are generally distributed on 12 regions of Iran, with a wide range of altitude form 920 in Khorasan Razavi province to 2950 m in Kerman Mountains and with different soil textures and slopes. Morphological, anatomical and phonological analysis of plant revealed similarities between all ecotypes to a great extent. Generally speaking, with respect to the valuable ecophysiological properties of *Bunium persicum* which is under the threat of extinction, conducting the basic researches in order to facilitate domestication and cultivation of plant is seems to be vital.

THERMAL STABILITY OF NATURAL ANTIOXIDANT IN VEGETABLE OILS

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Thermal stability, something important in the selection of edible oils, especially in industrial applications such as deep frying, the fried oils are often used in industrial plants. Local resistance to thermal decomposition characteristics of the antioxidant with increasing temperature from 90 to 150 increased volatility because they are less frequently during the induction period. Antioxidants in between, tocopherols are volatile at high temperatures due to high molecular weight and edible oils for use. Antioxidant properties of herbaceous plants, spices, fruits and vegetables depends on the type and Properties of the solvent used to extract them. So that the appropriate type and amount of polyphenols extracted power and antioxidant properties of different extracts. For example using ethanol extract of *Satureja* plant improve the oxidation stability of sunflower oil in 180°C temperature is due to the presence of two compounds thymol and Carvacrol.

Key words: natural antioxidants, Thermal stability, vegetable oils

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CHEMICAL COMPOSITION OF FIVE ECOTYPES OF *KELUSSIA ODORATISSIMA* MOZAFF. COLLECTED FROM DIFFERENT REGIONS OF IRAN

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The interest in nature as a source of potential chemotherapeutic agents continues. Natural products and their derivatives represent about half of the drugs in the world. *Kelussia odoratissima* Mozaff., is an important medicinal plant widely used in different parts of Iran as a garnish and with therapeutic effects. Unfortunately, plant has been forced into the endangered plants. The aim of this investigation was evaluating essential oil and chemical composition of different ecotypes of *Kelussia odoratissima* Mozaff, which was collected from five main plant habitats in Iran. Oil analysis results demonstrated that different ecotypes had differences in essential oil content. Chemical composition profile showed that 30 components were detected on essential oil of *Kelussia odoratissima* Mozaff. Even though the constituent's percentages were different ecotype by ecotype and some components were not identified on some ecotypes. In fact, quantitative and qualitative comparisons indicated many similarities between the ecotypes, but the amounts of some corresponding compounds were different. Samsami and Kohrang ecotypes had the highest components number with 37 compounds, while Khansar had the lowest with 23. Twenty four compounds were identified on Bazoft and Jahanbin ecotypes. Z-ligustilide was the most abundant constituents on all evaluated ecotypes with the average of 40.18%. E-ligustilide and 3-E-butyldiene phthalide were the other major oil components. Kessane, 2-octen-1-olacetate and Caryophyllen were also detected with high concentration. n-Pentacosane and 6-methyl-5-hepten-2-one was only detected on Samsami ecotype and with very low concentration (0.1%). N-undecanol was also recorded only on Samsami and Khansar ecotype and Citronellol compound was detected on Samsami and Kohrang ecotype. Phenyl ethyl propanoate and *p*-Methyl acetophenone are the compounds which were found on three ecotypes. Based on these results, different ecotypes of *K. odoratissima* Mozaff. have different chemical components profile and their habitats affect these properties.

STUDY THE EFFECT OF FOLIAR APPLICATION ON QUANTITATIVE AND QUALITATIVE YIELD OF CUMIN (*CUMINUM CYMINUM*) UNDER WATER STRESS

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In order to determine the effect of zinc and iron foliar application on yield and its component of cumin (*Cuminum cyminum*) under water stress condition, an experiment was carried out at agricultural Research Center of Mahan, Kerman during 2011-2012. Field Experiment was conducted in split plot design based on randomized completely block (RCB) at four replications. Main plots included water stress with dry farming and normal irrigation and sub plots were treatments of zinc, iron, zinc+iron foliar application and non-foliar application. Results showed that maximum quantities were in normal irrigation with zinc and iron foliar application on traits such as seed yield, 1000 seed weigh, RWC and minimum quantities were in dry land condition and without foliar application. But analysis on variation showed that zinc and iron foliar application had significant effect ($\alpha > 0.05$) on most traits at dry land condition such as protein total percent, proline, total carbohydrate and antioxidant enzymes such as super oxide dismutase (SOD). Means comparisons effect of foliar application at this test showed that Zinc and Iron foliar application is effective under dry land conditions [1, 2].

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EVALUATION OF ANTIOXIDANT CAPACITY OF THE ETHANOL EXTRACT OF IRANIAN *ANETHUM GRAVEOLENS*

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Antioxidants are major ingredients that protect the quality of oils and fats by retarding oxidation. Synthetic antioxidants such as butylated hydroxytoluene (BHT), butylated hydroxyanisole (BHA) and tertiary butyl hydroquinone (TBHQ) are widely used to prevent the oxidation of oils and fats and extend the shelf-life of lipid-containing foods. In recent years, their use in foods has suffered severe criticism, as consumers are becoming increasingly conscious of the safety of synthetic chemical additives; in addition, the use of these synthetic antioxidants is restricted because of their toxicity. This has led to an increasing interest in the search for naturally occurring antioxidants. This study was designed to evaluate antioxidant capacity of the ethanol extract of Iranian *Anethum graveolens*. In the inhibition of free radical 2, 2-diphenyl-1-picrylhydrazyl (DPPH) and β -carotene/linoleic acid system, the extract showed weaker but close antioxidant capacity comparing to BHT, as a synthetic antioxidant. In this regard, the ethanol extract was able to reduce the stable free radical DPPH with an IC₅₀ of 32 μ g/ml and in β -carotene/linoleic acid assay, inhibit the linoleic acid oxidation; exhibiting 61% inhibition at 2 g/ml. These parameters in BHT were 12 μ g/ml and 95%, respectively. It seems that the ethanol extract of Iranian *Anethum graveolens* has potent antioxidant effect which makes it as a potential antioxidant for oil and oily products.

THE COMPARISON OF SEED OIL AND PROTEIN CONTENT IN DIFFERENT SESAME GENOTYPES

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Sesame seed contains 50-60% oil which is resistance to oxidative deterioration and its cake is also a rich source of unique protein composition making it a nearly perfect food. The oil has medicinal and pharmaceutical value and has been used as active ingredients in antiseptics, bactericides, viricides, disinfectants and anti-tubercular agents [1]. This research was conducted to comparison of seed oil and protein contents in eighteen selected lines of sesame from various agro-climatic regions of Iran along with six exotic genotypes from the Asian countries, aiming to identify the best lines for further breeding programs and conservation of genetic resources of the crop. The genotypes were evaluated in a randomized complete block design with 3 replications under field conditions during 2008-2009. The seed protein and oil content were measured by Near Infrared Reflectance Spectroscopy (NIR) system (NIR Perten model 8620 A Socd). The results showed significant differences among genotypes for the traits studied. The mean protein content in all genotypes studied was lower than those reported by Sabah El Kheir et al. [2] and varied from 20.23% (Borazjan2) to 26.18% (Nazchandshake) in 2008 and 21.5% (Varamin2822) to 27.12% (Indian) in 2009. The oil content of the seeds ranged from 42.4 to 57.7 % with the average being 50.58%. The highest oil content were corresponded to Darab-2 (57.7%) followed by Darab-14 (56.4%) in 2008. These Iranian genotypes kept their superiority in the oil content with the average being 60.96% in 2009. Therefore, the mention genotypes can be used in recombination breeding programs to accumulate their favorable genes responsible for improving seed oil content.

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EFFECT OF PLANT PARTICLE SIZE ON EXTRACTION OF ROSMARINIC ACID FROM IRANIAN ROSEMARY AND LEMON BALM PLANTS

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Lemon balm (*Melissa Officinalis*) is one of the important medicinal plant species in the world. According to scientific classification it belongs to the family Lamiaceae. Lemon balm is used for several purposes such as additive in food, herb tea, ingredient in cosmetics, ornamental, medicine, and pharmacology due to its antioxidants. It is native in many part of the world. In Iran lemon balm is known by the names of Badranjbooye, varangboo, and faranjmoshk and is found in the north, north-west and western parts of the country. Rosemary (*Rosmarinus Officinalis*) also is used in many food applications in its ground form or as an extract. There are a number of phenolic compounds identified to be responsible for its antioxidative properties. Rosmarinic acid is one of the most important antioxidant found in the species of Lamiaceae and has many interesting biological activities. It has attracted much attention since it was identified to be the main compound responsible for the antiviral activity of lemon balm. Ethanolic extracts of rosemary and lemon balm contains high concentration of phenolic, especially rosmarinic acid. The aim of this study is investigation of effect of plant particle size on amount of rosmarinic acid extracted from plants of rosemary and lemon balm. First, the whole amount of rosmarinic acid of rosemary and lemon balm plants is extracted and analysed. Then the effect of plant particle size on yield of rosmarinic acid extraction is investigated. The studied plant particle sizes are: <0.125 mm, 0.125-0.25 mm, 0.25-0.5 mm. All of the experiments are performed based on British Pharmacopeia [1-9].

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METHYL JASMONATE-INDUCED CHANGES IN TOTAL PROTEINS, CHLOROPHYLLS, ANTHOCYANIN AND PEROXIDASE ENZYME OF PEPPERMINT (*MENTHA PIPERITA*)

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Known as mint or peppermint, *Mentha piperita* L. is used for medicinal and food purposes. Its cultivation has economic importance, due to its ability to produce and store essential oil, whose main constituent is menthol, used in oral hygiene products, pharmaceuticals, cosmetics and foods. Menthol also has high anti-fungal and anti-bacterial potentials, thus becoming one of the most demanded substances by the scents and essences industry [1]. Because of this and other reasons, peppermint essential oil ranks high in terms of total sales volume [2]. Jasmonic acid and its methyl ester (methyl jasmonate MJ) are *c*-linolenic acid (LA) derived cyclopentanone based compounds and are widely distributed in the plant kingdom [3]. The Methyl jasmonate, a naturally occurring compound, plays important roles in plant growth and responses to environmental stresses. The peppermint plants were initiated from 10 cm-long rhizome cuttings followed by transferring into pots. The 24 h- and 48 h-treated plants with methyl jasmonate concentrations (0, 0.1 and 0.5 mM) were assessed for their total soluble proteins, chlorophylls (a, b and total), anthocyanin and activity of antioxidant peroxidase (POD) enzyme. The data were analyzed, using balanced 2-factorial ANOVA on the basis of randomized complete block design (RCBD) with 3 replications. Mean comparisons were carried out using Duncan's multiple range test. The results showed significant differences in all parameters examined. MJ caused accumulation of anthocyanin and total soluble proteins, reduction of chlorophylls (a, b and total) and elevation of POD activity in the leaves. These results indicate that MJ can effectively improve defense system and antioxidant capacity of *Mentha piperita*.

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16, 17 May 2012
Kish Island



A STUDY ON EFFECT OF *FRTILLARIA IMPERIALIS* BULBS AND *ROSA CANINA* FRUITS ON PROLIFERATION OF THE BREAST ADENOCARCINOMA CELLS (MCF-7) *IN VITRO*

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Within the developed countries breast cancer is the commonest malignancy in women, it is estimated that approximately one in 12 women will develop breast cancer in their lifetime .In Iran, it includes about %21/4 of malignancy cancers among women. Fruits of *R. canina* L. possess disorders including arthritis, cardiac, cancer, rheumatism, gout and sciatica .The dried bulbs or a decoction of *Fritillaria* species are to be prescribed to treat coughs, asthma, bronchitis, scrofula, glands, tumors, hemoptysis and deficiency of milk . In the present study, therefore, we wish to investigate whether the ethanolic and aqueous extract of these plants are effective on breast cancer (MCF-7).Effects of extracts were surveyed in different 8 densities and effect of 5- fluorouracil drug pursuant previous studies in IC₅₀ density on cancer cell line of breast and fibroblast as control. Analysis of variation of data was performed as ANOVA with SAS software. IC₅₀ for all of extracts determinate by ED₅₀ plus V1.0 software. MTT assay was used for cytotoxicity, 5-Bromo-2'-deoxyuridine (BrdU) assay for cell proliferation and TUNEL test was used for measuring apoptotic cell death. At MTT and BrdU test was perceived that every 4 type of extracts had cytotoxic and cytostatic effects with probability %99. Ethanolic extract of *F. imperialis* was most potent factor on these cells lines. Viability percentage observed %35.148 and %50.36, reading optic density (OD) at density of 2800 µg/ml were 0.1415 and 0.4865 nm and IC₅₀ values were 1599.55 µg/ml and 3010.46 µg/ml on MCF-7 and fibroblast respectively. Apoptose percentage at 2400 and 1600 µg/ml denseties was determined of aqueous and ethanolic extracts. These values for *F.imperialis* were 32% and 100% and for *R. canina*, estimated 24% and 83% respectively on MCF-7 cell. These data indicate all of extracts have cytotoxic, cytostatic and pro-apoptotic activities on these cells line, but all of them were less toxic for fibroblast. Probably antioxidants and quercetin of *R. canina* via immunomodulatory and CDK inhibitory and jervine in *F. imperialis* with growth inhibitor activity, cause cytotoxic effects.

THE QUALITATIVE AND QUANTITATIVE STUDY OF THE ESSENTIAL OIL CHEMICAL COMPOSITION OF *SALVIA REUTERANA* BOISS. IN DIFFERENT DEVELOPMENTAL STAGES

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Salvia reuterana Boiss belongs to Lamiaceae family which distributed worldwide and its essential oil is utilized in medicinal industry and has antibacterial and anti-inflammatory properties [1]. The aim of this study is to identify the chemical composition of the volatile oil of this plant during different stages of growth. *Salvia reuterana* were collected from the campus of Islamic Azad University of Roudehen in their different developmental stages such as: different vegetative and reproductive stage, from 4 to 6 leave and 8 to 10 leave stage, flowering stage, fruit production stage, and seed production stage since the 1st of April till the end of July. The essential oils were isolated by hydrodistillation from the aerial parts of the *Salvia reuterana* species and analyzed by capillary GC and GC/MS. The components of the oils were identified by comparison of their mass spectra and retention indicates with Wiley library and those published in the literature [2] The most abundant components of the volatile oil refers to seed stage in which 64 compounds were identified whose distinctive compounds are as follows: Germancren D during 4 to 5 leave stage, Thymol during flowering stage and β-Sellinene during fruiting stage. GC and GS/MS analysis indicated Sesquiterpene Fraction as the major component of the plant essential oil and seed can be used as the most important part to extract the essential oil.

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THE EFFECT OF DIFFERENT FRACTIONS OF METHANOLIC EXTRACT OF *NIGELLA SATIVA* ON GUINEA PIG TRACHEAL CHAINS

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In previous studies, the relaxant, anticholinergic (functional antagonism) and antihistaminic effects of *Nigella sativa* have been demonstrated on guinea pig tracheal chains. In addition, our last study showed a potent relaxant effect of 20% methanolic fraction from *Nigella sativa* on tracheal chains of guinea pigs. Therefore in the present study, for the first time, for identification of the main constituent(s) inducing relaxation, the effects of different constituents of this fraction were evaluated. This fraction was assessed by analytical and preparative HPLC, yielded four constituents including two flavonoids (1-20% and 2-20% fractions) and two polysaccharides (20-20% and 21-20% fractions). The relaxant effects of four cumulative concentrations of each constituent (50, 100, 150, 200 µg/lit) in comparison with saline as negative control and four cumulative concentrations of theophylline (0.2, 0.4, 0.6 and 0.8 mM) were examined by their relaxant effects on precontracted tracheal chains of guinea pig by 10 µM methacholine (n = 7 for each group). Most of concentrations of three fractions (all except 2-20% fraction) showed relaxant effects on tracheal chains compared to saline (p<0.001 to p<0.05). The 20-20% fraction (comferoldiglucoside) showed a potent relaxant effect on guinea pig tracheal chains and the 21-20% fraction (comferolglucogalactoside) was the second relaxant constituent. The lowest relaxant effect was about 1-20% fraction. However, all of these four constituents were lower than theophylline. The relaxant effects of these constituents were lower than that of 20% methanolic fraction from *Nigella sativa*. It may be due to lack of synergistic effects of each on others.

THE POSITION AND PROBLEMS ENCOUNTERED WITH THE USE OF HERBAL MEDICINE IN THE SOCIETY: A CASE STUDY IN SARI CITY, NORTH OF IRAN

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Medicinal plants constitute a source of raw materials for both traditional systems of medicine and modern medicine [1]. Nowadays, plant materials are employed throughout the industrialized and developing world as home remedies, over-the-counter drugs, and ingredients for the pharmaceutical industry [2]. In the developed countries, 25 percent of the medical drugs are based on plants and their derivatives [3]. Therefore it is necessary to know that how the situation in Iran is for assessing the position of herbal medicinal product. Thus, this study was undertaken to collect information from pharmacists whom works in drugstore in Sari city, northern Iran during October 2011 to December 2011. The questionnaires were used to obtain information. The total numbers of 80 questionnaires were used (the entire drugstore in Sari city). Finally, the SPSS software was used to analyze the data. This study showed that just 25 percent of prescriptions are based on plants and their derivatives and the remaining (75 percent) of them are synthetic. Less than 5 percent of the medicines in Iran are based on plants material while the 65% of patient prefer herbal products. Sexually transmitted diseases (18%), skin diseases (16.2%), dysmenorrhea (11.9%), kidney diseases (11%), flu (7.6%) and joint pain (5%) were the main diseases that patients preferred to use natural products. Tablets (65%), syrup (20%), ointment (11%) and plant extract (4%) were also the main dosage forms of natural products used by the patients. From point of view of pharmacist, delay in treatment procedure (60%) and unsuitable packing (30%) are the most problem for using of herbal products. Physician prescriptions and suitable packing are two important things clarified by 76 percent of pharmacist that may increase the role and usage of herbal medicine among the patients. According to this investigation, improving medical education, improving formulation and the extraction of active ingredients for increasing the effectiveness of herbal medicine with suitable packing are the main important things that could alternate chemical medicine to herbal. Hence, adverse effects of synthetic medicine can be decreased and herbal medicine can gain its global importance.

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THE EFFECTS OF LEAD HEAVY METAL ON HEMP (*CANNABIS SATIVA L.*) SEED GERMINATION AND SEEDLING TRAITS

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The laboratory experiment as Completely Randomized Design was conducted to investigate the effects of different concentrations of Lead nitrite $Pb(NO_3)_2$ including 0, 200, 400, 800 and 1000 μmol on germination of Hemp. 50 seeds were placed to petri dishes containing filter paper after surface sterilization in four replications for each treatment. Some characteristics such as sum of germinated seeds (SGS), mean of germination time (MGT), germination rate (GR), seedling dry weight (SDW), radicle length (RL), plumule length (PL) and seedling length (SL), percentage of germination (G) and seed vigour (SV) were evaluated. Results showed that Pb stress had significant effect ($p \leq 0.1\%$) on all of these characters except SGS and GR. SGS, PL, RL, SL, G and SV were decreased by increase in Lead nitrite. There were no significant effect between 0 and 200 as well as 400 and 800 μmol of Lead nitrite on SGS, PL, SL, G and SV. Whereas difference between 1000 μmol concentration and other levels was significant. PL shows 0.15% loss than control treatment. Results obtained from this research indicated that Pb stress has no significant effect on MGT and GR. It seems that in short term stress of Pb, hemp decrease stress intensity with induction of fast response, but, in spite of definition that exist for the tolerable plants of Pb, it does not seem to include Hemp from tolerable plants to this heavy metal [1].

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STUDY OF RESPIRATORY TOXICITY OF ESSENTIAL OIL FROM *EUCALYPTUS CAMALDULENSIS* DEHNH. (MYRTACEAE) AGAINST *APHIS FABAE* SCOP. (HEM.: APHIDIDAE) AND *MYZUS PERSICAE* SULZER (HEM.: APHIDIDAE)

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Respiratory toxicity of essential oil from *Eucalyptus camaldulensis* Dehnh (Myrtaceae) on the mature wingless aphids including two species of *Aphis fabae* Scop (Hem.: Aphididae) and *Myzus persicae* Sulzer (Hem.: Aphididae) were investigated in temperature conditions of 27 ± 3 °C and relative humidity of 60 ± 5 . Afterwards, LC_{50} was determined after the calculation of losses. In the next stage, aphids were exposed to different concentrations of essence for a minimum time of 24 hours and a maximum time of 72 hours. Fumigation method was employed to perform bioassay of essence. An increase in concentration and time led to an increase in mortality rate. There was no significant difference between the three essence samples with a concentration of 950, 1700 and 3000 parts per million with regard to insecticidal activity. It was observed that over 90% of insects were killed in the mentioned concentrations. It had high mortality in both species of aphids. *Myzus persicae* Sulzer showed the highest sensitivity with respect to the application of the essence and its mortality rates were also higher than *Aphis fabae*. For *Aphis fabae* Scop, LC_{50} values determined for *Eucalyptus camaldulensis* Dehnh. (Myrtaceae) were amounted 1.3189 mg per each liter of air, respectively which were equal to concentration of 1318.98 units per million. For *Myzus persicae* Sulzer, LC_{50} values determined for *Eucalyptus camaldulensis* Dehnh. Amounted 1.1298 mg per each liter of air, which were equal to concentration of 1129.88 units parts per million. The obtained results demonstrated the practicality of using *Eucalyptus camaldulensis* Dehnh. Against aphids.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECTS OF SPRING PLANTING DATES ON SOME QUALITATIVE AND QUANTITATIVE CHARACTERS OF DWARF CHICORY (*CICHORIUM PUMILUM*)

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Dwarf chicory is one of the medicinal species of the genus *Cichorium* that is native to Iran and is a volunteer plant that grows south and western south of Iran. During process of preliminary domestication of this type of chicory, an experiment was conducted on spring planting dates and possibility of different harvests as RCBD including three planting dates 20th March., 21th April and 22th May 2008 with three replicates in research station of college of agriculture, Ferdowsi university of Mashhad. Results showed that planting dates had significant effect on dry weight of leaves and stalk and on different harvests and dry weight of leaves in March was higher compared to other two planting dates. Javidtash (1996) confirms the results for superiority leaves yield 4th April relative to 19th April and 5th May. Dry weight of stalk was superior in planting dates of March and April and April than May. Different harvests had significant effect on dry weight of leaves and stalk and on leaves to stalk ratio and first harvest was superior significantly relative to second harvest. First harvest and first planting date were best among other treatments produced highest rates of leaves and stalks. Leaf to stalk ratio in first harvest was 1.68 and almost two fold(.083) relative to second harvest. Number of stalks in m² in first planting date was higher relative to other planting date but stalk height was taller in late May. In third planting date nodding was unsteady and about 10% of plants did not produce stalks. Gianquinto (1997) suggested that leaf chicory *v. silvestre* flowers due to long days. Planting dates had significant effect on total phenols so that planting date May had highest and in March least amount of phenolics. It seems that phenolics increase in late plantings of spring is due to higher temperatures stress in late vegetative growth of chicory. Rivero et al. (2001) reported that thermal stress induces phenolic biosynthesis and reduce their oxidation.

MEDICINAL HERBS FROM UMBELLIFERAE FAMILY FOR TREATMENT OF EPILEPSY- A REVIEW ON TRADITIONAL APPLICATION AND RECENT MEDICAL RESEARCHES

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Despite the availability of many antiepileptic drugs (AEDs), nearly one in three patients with epilepsy who have access to AEDs continue to have seizures, and a similar proportion experience unacceptable AED-related adverse effects [1]. According to global approach to use plants for producing new medicines, application of botanical and traditional information for antiepileptic herbs can help to choose useful plants for discovering new efficient drugs with low adverse effects. Herbs from Umbelliferae family have a wide dispersion in Iran and people have identified most of these species and applied them for medicinal and nutritious usages. In present survey, anti-epileptic effects of these plants in traditional medicine and recent researches will be studied. At first, herbal section of the most important traditional Iranian medical books was studied and a list of plants from Umbellifera family that have been applied in epilepsy with recipe of them have been provided. In next step, some researches concerning anti-epileptic effects that have been done on these plants during current years have been studied in data banks like Science Direct, Medline and Google scholar. Until now, among herbs from Umbelliferae family that their antiepileptic effects mentioned in traditional Iranian medicine, anticonvulsant activities of *Pimpinella anisum*, *heracleum persicum*, *Ferula assa-foetida*, *Ferula gumosa* and *Ferula persica*, have been proven in animal models. Also in some cases the effective compounds and those mechanisms was determined. Medical properties of *Dorema ammoniacum* are similar to assafoetida and spasmolytic effects of this herb also have been proven. Moreover, muscle relaxant effects from extract of *coriandrum sativum* have been reported. There is no agreement about the scientific name of a plant that called Jaosheer and its anti-epileptic effects in current sources. According to results of this study, Information for anti-epileptic herbs from Umbelliferae family in traditional Iranian medical references can be a valuable source for selecting useful medicinal plants in order to discover new anti-epileptic medicines.



EFFECTS OF DROUGHT STRESS AND HARVESTING TIME ON GRAIN YIELD AND ITS COMPONENTS OF FENNEL (*FOENICULUM VULGARE* MILL.)

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To study the effect of drought stress and harvesting time on yield and its components of fennel, a field experiment was conducted at College of Agriculture, University of Zanjan in the spring of 1390. The experiment was conducted as a split plot based on complete randomized block design with three replications. In this study the effects of water stress in three levels including control, drought stress at flowering and grain filling stages were assigned to the main plots and three harvesting time including harvest at soft dough, hard dough and maturity stages were assigned to the sub plots. The results showed that the effect of drought stress on seed yield, 1000-seed weight, number of umbellet in umbrella, number of seed in umbellet, number of seed in umbrella was significant ($p \leq 0.05$). Majority of mentioned traits decreased significantly ($p \leq 0.05$) under drought stress condition. So the highest grain yield (1436.63 kg/ha) was obtained in control treatment (full irrigation) and the lowest grain yield (995.45 kg/ha) was obtained from drought stress at grain filling stage. The results also showed that the effect of harvest time on seed yield, 1000-seed weight, number of seed in umbellet and number of seed in umbrella, was significant ($p \leq 0.01$). So the highest and lowest seed yield (1425.75 and 784.81 kg/ha) was obtained in hard dough and maturity stages respectively.

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THE EFFECTS OF ROSA DAMASCENA ON GASTRIC ACID SECRETION IN RAT

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Damask rose (*Rosa damascena* Mill) has been recommended for its analgesic, antidepressant, anti-inflammatory, diuretic and laxative effects in traditional medicine [1]. The effects of *Rosa damascena* boiled extract on gastric emptying was previously reported by this group [2]. The effect of the extract on gastric acid secretion has been investigated in this research. Twenty rats were randomly allocated into 4 groups. All rats were fasted for 24h and then received either atropine (100µg/kg, ip) or placebo. The abdomen was opened under anesthesia, and the pylorus was ligated. The boiled extract of *Rosa damascena* (1500mg/kg) or placebo was injected into the duodenum. Cardia was ligated 4h later and the stomach was removed. The acidity of the stomach content was measured using NaOH 0.01N for titration and phenolphthalein as an indicator. The acidity in the test group (receiving the extract) was significantly higher (0.730 ± 0.086 mEq/L) compared to that of the control group (0.381 ± 0.060 mEq/L). The acidity in atropine receiving groups was significantly lower, with or without the extract (0.174 ± 0.020 and 0.191 ± 0.024 mEq/L respectively). The current results suggest strong stimulatory effect on gastric acid secretion for the boiled extract of *Rosa damascena* in rats. This effect seems to be mediated via acetylcholine.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



IN VITRO EFFICACY OF *ORIGANUM VULGARE* ESSENTIAL OIL AGAINST *BOTRYTIS CINEREA* Pers.:Fr.

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Origanum vulgare is a perennial herbaceous plant belonging to the Lamiaceae family. *O. vulgare* subsp. *gracile* is one of the three subspecies are found in Iran and grows wildly in northwest provinces of the country. Essential oil of the aerial parts of *Origanum*, regarding to biological activities, has antibacterial, antifungal, antimicrobial, antiparasitic, insecticidal and antioxidative effects, and it has been used as a stimulant, antitussive, sedative, expectorant and analgesic in pharmaceutical and spice industry. The antifungal activities of flowers and leaves essential oil of *O. vulgare* subsp. *gracile* were investigated in a poison food medium (200-1000 $\mu\text{l l}^{-1}$) against *Botrytis cinerea* Pers.:Fr. *Botrytis cinerea* is an important postharvest pathogen that cause grey mold and can particularly cause heavy economic losses on fruits, vegetables and flowers. The results showed that the essential oils tested had significant inhibitory effects on the growth of fungus. The both oils completely inhibited the growth of *B. cinerea* when added at concentrations $> 400 \mu\text{l l}^{-1}$, but their inhibitory effects were only fungistatic. Further studies are necessary to confirm antifungal activities of *O. vulgare* subsp. *gracile* oil under *in vivo* conditions, as this oil might be used for preservation and/or extension the shelf-life of agricultural crops, since the essential oils generally recognized as safe products.

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EFFECT OF SALT STRESS ON SOME MORPHOLOGICAL AND PHYSIOLOGICAL CHARACTERISTICS OF *CUMINUM CYMINUM*

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In this study the effects of salt stress on some morphological and physiological characteristics of *cuminum cyminum* plants an experiment based on RCBD conducted at glasshouse and laboratory research of Kerman University. Treatments were included all combinations at nine cuminum cultivars (Pars, Semnan, Kerman, Yazd, Northern khorasan, Southern Khorasan, Razavi Khorasan, Golestan and Esfahan) and three levels of salt (NaCl) concentrations (4, 6 and 8) dS/ m. plant growth characteristic including (chlorophyll content, ion leakage, relative water content, percentage of germination, root length, shoot length, root dry weight, shoot dry weight) were measured Results showed that all plant characteristics were significantly affected by salt stress compare to control condition. Meanwhile chlorophyll content and ion leakage showed a reverse response.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



SALICYLIC ACID INDUCED GROWTH AND BIOCHEMICAL ACTIVITIES OF CHICKPEA PLANTS GROWN UNDER SALT STRESS

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The ability of plants to tolerate salt is determined by multiple biochemical pathways that facilitate retention and or acquisition of water, protect chloroplast functions and maintains ions (1, 2, 4). Essential pathways include those that lead to synthesis of osmotically active metabolites and certain free radicals scavenging enzymes that control ion and water flux and support scavenging oxygen radicals. Salicylic acid (SA) is recognized as a novel group of Phytohormone to regulate the plant growth and their productivity. SA play an important role in abiotic stress tolerance and considerable interests have been focused on SA due to its ability to induce a protective effect on plants under stress (3,5). The differential responses of two chickpea (*Cicer arietinum* L.) local Iranian genotypes to salinity (0, 75 and 150 mM NaCl) and foliar spraying with salicylic acid (0 and 20 mM) in flowering to physiological ripening stage were studied. Salinity caused no significant changes in Ca, K and shoot length of Tabriz genotype, whereas they were significantly reduced in Mashhad genotype. Genotype of Tabriz exhibited higher accumulation of Proline, Chlorophyll α / chlorophyll β and antioxidant enzymes activity (CAT, POD, APX & GR) than genotype of Mashhad. In contrast, root length and dry root weight were lower in genotype of Tabriz than in genotype of Mashhad. Salinity induced high selectivity of K⁺/Na⁺ ratio in genotype of Mashhad than genotype of Tabriz and in shoot than in root for both genotypes. Application of SA not only mitigated the inhibitory effect of salt stress in both genotypes, but also in some cases induced a stimulatory effect greater than that estimated in the control plants, foliar spraying of SA increased CAT and SOD in both cultivars but not effect on POD and GR. The results indicated that both chickpea genotypes can develop different mechanisms of adaptation to salt stress. The beneficial effect of SA could be used for improving their salt tolerance.

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THE EFFECT OF NEUTRON IRRADIATION AND ALOE VERA JEL APPLICATION ON QUALITY AND STORAGE LIFE OF CUCUMBER FRUITS (*CUCUMIS SATIVUS* L. *NEGEEN*)

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In order to improve the quality and storage life of cucumber fruits, an experiment was carried out with Randomized Completely Design with 3 replications and 14 treatments. Neutron irradiation (5 Ci) at 3 periods (24, 48, 72 h) and *Aloe vera* gel at 3 concentrations (30, 60, 90ppm) were applied. Harvested cucumber (Negin CV) fruits treated and stored in condition with different temperature (4, 25 °C) for 28 days. The color changes and fruit weight loss were measured for 28 days. The results showed that there is a significant difference between two temperatures (25 and 4 °C) and fruits which treated with neutron irradiation (24, 48 hours) and stored in 25 °C had showed the lowest weight loss (18.55, 19.28 percent respectively). The best quality of treated fruits detected in cucumbers that irradiated with neutron during 48h in both temperature regions.



PHYTOREMEDIATION: ZN, CD AND FE BIOACCUMULATION IN ROOT, LEAF AND FRUIT OF STRAWBERRY PRODUCED IN HYDROPONIC CONDITIONS

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Strawberry from rosaceae and genus *Fragaria*. Different varieties of strawberry are cultivated for food using. Recently hydroponic method of its cultivation has been developed in iran. Because industrial material in hydroponic system, included toxic heavy metals are used for preparing the row materials of the hydroponic system. So in study concentration and accumulation of this metal in organs root, leaf and fruit were investigated with atomic absorption apparatus. The experiments was done with two factors (factor 1, heavy elements included Zn and Fe levels) and (factor 2, nutrition level at two level) based on randomized complete blocked design with three replication. The result of the variance analysis indicated that there was no significant difference between replication but there was a significant difference between the heavy metals, their levels and the interaction between two factors ($P \leq 0/01$). We disregarded of comparing main effects because of significant interaction effects. Comparing the main data of root, leaf and fruit of strawberry showed that the highest accumulation of heavy metals was related to iron with its level in root or fruit is equal to (3ppm or 5 ppm respectively) study of accumulation of elements in dry matter of root, leaf and fruit of strawberry indicated that the highest accumulation of Fe and Zn was observed in the leaf of strawberry. The lowest accumulation of heavy element except of cd was observed in the fruit of plant.

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LEAF FLAVONOIDS OF *AEGILOPS COLUMNARIS* ZHUK (POACEAE)

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Aegilos L. (Poaceae) is considered to be one of the ancestors of the cultivated wheat [1]. It consists of only one donor species to the gene pool of *Triticum* and has an important potential utilization in wheat improvement [2, 3]. *Triticum* has been examined for its flavonoid constituents [4]. An examination of the phenolic constituents of *Aegilopsouata* was undertaken [5, 6]. Also two novel phenolic diglycerides have been isolated from *Aegilopsouata* together with scopoletin and p-coumaric acid [7]. Diploid *triticum* species could be divided into two groups depending on the presence or absence of two major di-C-glycosylflavones [8]. Flavonoids are a major group of constituents and are assumed to be among the beneficial components. Recently, they have also received considerable interest as components of food stuffs and nutritional because of their antioxidant and anticancer properties. Phytochemical studies of *Aegilopscolumnaris* carried out on collected plant leaf from Markazi Province. Detection, isolation and identification of leaf flavonoids were done using 2-DPC and TLC based on available references [9, 10]. Results showed *Aegilopscolumnaris* species has flavones C&C-/O glycosides and flavonoid sulphates. Apigenin, chrysin, isorhamnetin, kaempferol, luteolin, morine and quercetin were found in the species leaf.

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INVESTIGATION THE EFFECT OF AQUEOUS EXTRACT OF WORMWOOD PLANT (*ARTEMISIA ABSINTHIUM L.*) VEGETATIVE CONFIGURATION ON SEED GERMINATION AND SEED GROWTH OF CRESS (*LEPIDIUM SATIVUM*), PARSLEY (*PETROSELINUM SATIVUM*) AND SAVORY (*SATUREJA HORTENSIS*).

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Germination is a critical stage in the life cycle of weeds and crop plants, and often controls population dynamics, with major practical implications. Allelopathy refers to the beneficial or harmful effects of one plant on another plant, both crop and weed species, by the release of chemicals from plant parts by leaching, root exudation, volatilization, residue decomposition and other processes in both natural and agricultural systems. This study was done reviews the ability of wormwood extract allelopathy on Cress (*Lepidium sativum*), Parsley (*Petroselinum sativum*) and Savory (*Satureja hortensis*) germination. Wormwood is the manual, gramineous and aromatic plant from Compositae family that its mainland areas are the Mediterranean and the temperate regions. Plants body of Compositae family individually was dried at 60C and then ground. Each of plant's powder was used for producing extraction with 10% concentration and extracts passed through two layers of sterile cloth to remove all of debris. The extracts were centrifuged at low speed (3000 rounds/ minute) for 45 minutes and were prepared the concentration of 25, 50, 75 and 100 percent and double distilled water was used as control. The experiment was carried as factorial design and was applied in RC design with 3 replications. Analysis of variance showed significant differences between the simple effects of experimental factors for rootlet length, length shoot let, fresh weight and other hand the interaction effect for germination levels and germination rate was significant. Allelopathic effect on germination indices Savory was higher than other vegetable. Examine the interaction of factors for the trait germination showed that combination treatment plant parsley in 1% extract significantly with plant Savory on 50% extracts and Cress plant in 75% extracts and the levels of germination, plants be stopped. With increasing concentration of extract, seed germination levels increased in 25% level and germination decreased significantly in 1% level. Most germination at different levels of wormwood extract was observed and these values except for the Cress plant in 25%, with no significant difference. Maximum germination observed in the parsley in 75%. Survey results suggest extract of wormwood has been strong allelopathic effect and the wormwood extract showed delayed germination and subsequent increase in germination at higher concentrations of the extract. Based on the above results Cress plant has been greatest resistance plant to the wormwood extract.

THE INFLUENCE OF SILVER NANOPARTICLES ON QUALITATIVE AND QUANTITATIVE YIELD OF BORAGE

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Ethylene can influence plant growth and development processes such as fruit ripening, abscission and seed germination. The effect of ethylene can be suppressed by use of some compounds such as silver ions [1]. Silver nanoparticles are novel silver compounds that were developed using nanotechnology [2]. Borage (*Boragoofficinalis L.*) is an herbaceous annual plant. Current interest in this crop is for its oil seed which contains a high amount of gamma linolenic acid [3]. This study was aimed to evaluate the effect of silver nanoparticles on qualitative and quantitative yield of borage plant. The experiment was carried out in a completely randomized block design with three replicates. The treatments were three concentrations of silver nanoparticles (20, 40, 60 ppm) and control which sprayed on aerial parts of plant at onset seed set stage. The results showed that various concentrations of silver nanoparticles had a significant effect ($p < 0.01$) on silver concentration in the plant tissues. The highest silver concentration in tissues observed in the silver nanoparticle 60 ppm. It was found that different concentration of silver nanoparticles had a significant effect on dry weight of aerial parts and flowers, mucilage percentage, swelling index, phenol content ($p < 0.05$) and seed yield ($p < 0.01$). Increasing concentrations of silver nanoparticle cause to increase these parameters (dry weight of aerial parts and flowers, mucilage percentage, swelling index and seed yield) and the highest amount of them were observed at silver nanoparticle 60 ppm while phenol content in control was the most. We were observed reduction in seed abscission with silver nanoparticles application. This reduction in seed abscission leads to increasing in the seed yield of borage. Silver ions cause to prevent of ethylene action had positive effects on growth and qualitative and quantitative yield of borage.

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16, 17 May 2012
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LEAF FLAVONOIDS OF *AEGILOPS COLUMNARIS* ZHUK (POACEAE)

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Aegilos L. (Poaceae) is considered to be one of the ancestors of the cultivated wheat [1]. It consists of only one donor species to the gene pool of *Triticum* and has an important potential utilization in wheat improvement [2, 3]. *Triticum* has been examined for its flavonoid constituents [4]. An examination of the phenolic constituents of *Aegilops ovata* was undertaken [5, 6]. Also two novel phenolic diglycerides have been isolated from *Aegilops ovata* together with scopoletin and p-coumaric acid [7]. Diploid *triticum* species could be divided into two groups depending on the presence or absence of two major di-C-glycosyl flavones [8]. Flavonoids are a major group of constituents and are assumed to be among the beneficial components. Recently, they have also received considerable interest as components of food stuffs and nutritional because of their antioxidant and anticancer properties. Phytochemical studies of *Aegilops columnaris* carried out on collected plant leaf from Markazi Province. Detection, isolation and identification of leaf flavonoids were done using 2-DPC and TLC based on available references [9, 10]. Results showed *Aegilops columnaris* species has flavones C & C/O glycosides and flavonoid sulphates. Apigenin, chrysin, isorhamnetin, kaempferol, luteolin, morine and quercetin were found in the species leaf.

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STUDIES OF LEAF FLAVONOIDS OF *CYPERUS* L. SPECIES IN MARKAZI PROVINCE, IRAN

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Flavonoids are set of the polyphenolic compounds in plants that possess a wide range of biological activities [1]. *Cyperus* L. from *Cyperoideae* (Cyperaceae) with 600 species in the world [2] and 16 species in Iran [3, 4]. Some flavonoid compounds have been reported from the *Cyperus* genus [5, 6]. More than 4000 varieties of flavonoids have been identified in plants. Many flavonoids are active principles of medicinal plants and exhibit pharmacological effects. Numerous epidemiological studies confirm significant relationship between the high dietary intake of flavonoids and the reduction of cardiovascular and carcinogenic risk. They are also beneficial for the plant itself as physiological active compounds, as stress protecting agents, as attractants or as feeding deterrents, and, in general, by their significant role in plant resistance and reproduction [7]. Phytochemical studies on 5 collected *Cyperus* species (*C. esculentus*, *C. fuscus*, *C. iria*, *C. longus* and *C. rotundus*) from different parts of Markazi Province, Iran area were done using two-dimensional paper chromatography (2-DPC) and thin layer chromatography (TLC). Voucher specimens of each species were prepared for reference as herbarium vouchers. Results showed all of studied taxa contain flavonoid sulphates, flavones C and C/O glycosides and aglycones. There was Luteolin in all of species with the exception of *C. fuscus* and Rutin was found in three species. *C. longus* had Vitexin, and Kaempferol was just found in *C. rotundus*. Myricetin was not found in *C. rotundus* and *C. fuscus* whereas three other species had. Morine was found in *C. fuscus* where as others lack.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ROOT, LEAF AND FRUIT FLAVONOIDS OF *TRIBULUS TERRESTRIS* L. (ZYGOPHYLLACEAE)

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Phytochemical studies of *Tribulus terrestris* L. (Zygophyllaceae) carried out on collected root, leaf and fruit from Markazi Province, Iran. The genus *Tribulus* has 25 species in the world [1]. Rechinger has reported four species in Iran that *Tribulus terrestris* is characterized by having four spines in mericarps of fruit [2]. The species is used in the traditional medicine of many countries for treatment of cardiac diseases, edema, eye trouble, skin disorders, urinary troubles and stones in the bladder, as a diuretic, aphrodisiac and etc. [3]. The plant is reported to contain steroidal saponins, alkaloids and flavonoids [4, 5]. The quantities and presence of important metabolites depend on the various parts of the plant used. Yekta et al studies showed existing quercetin 3-*O*-glycoside, quercetin 3-*O*-rutinoside and kaempferol 3-*O*-glycoside in aerial part of the species [6]. They are flavonoid compounds. Many flavonoids are active principles of medicinal plants, exhibit pharmacological effects and contribute to human health. Today, flavonoids are used for making antitumour, anticancer, antibacterial, antiviral, antifungal drugs and insecticides. In this study, root, leaf and fruit flavonoids of *Tribulus terrestris* are reported. Aqueous-ethanolic extracts of collected plant material were examined to practice flavonoid detection, isolation and identification by 2-Dimensional Paper Chromatography, Thin Layer Chromatography and available references. Voucher specimen was prepared for reference as herbarium voucher. Results showed root of the species contains flavonoid sulphates, flavone *C* and *C*-*O*-glycosides and aglycones whereas flavone *C* and *C*-*O*-glycosides was not found in leaf and fruit. Chrysin was just identified in fruit while root and leaf had not any Chrysin.

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THE EFFECT OF CALCIUM NITRATE ON SEED YIELD OF BORAGE (*BORAGO OFFICINALIS* L.)

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It is well known that calcium is one of the essential macro elements for plant growth which is involved in a large variety of physiological processes in plants such as signal transduction, photosynthesis and nitrogen metabolism [1]. Borage is a valuable medicinal plant which is used in treatment of different human diseases [2]. Seeds of borage are used in pharmaceutical products because they are rich in gamma-linolenic acid, an essential and unusual fatty acid [3]. However, seed production of borage is limited by flower and seed abscission [2]. The objective of this study was investigating the effect of calcium nitrate on seed yield of borage. The experiment was performed in a completely randomized block design with three replicates. The treatments were three concentrations of calcium nitrate (5, 10, 15mM) and control which sprayed on aerial parts of plant at onset seed growth stage. The results showed that various concentrations of silver nanoparticles had a significant effect ($p < 0.05$) on calcium concentration in the plant tissues. The highest amount of calcium in plant tissues was observed at the calcium nitrate 15 mM. It was found that different concentration of calcium nitrate had a significant effect on dry weight of aerial parts and inflorescence, seed yield ($p < 0.05$), seed abscission reduction index, flower abscission and seed weight ($p < 0.01$). Increasing concentrations of calcium nitrate caused to increase these parameters (dry weight of aerial parts and inflorescence, seed abscission reduction index and seed yield) and the highest amount of them were observed at calcium nitrate 15mM. A decreasing in flower abscission and seed weight was being observed with application of calcium nitrate. Therefore, increasing in the borage seed yield was due to seed and flower abscission reduction and increasing the number of inflorescence.

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INFLAMMATORY BOWEL DISEASE IN IRANIAN TRADITIONAL MEDICINE: A COMPARATIVE STUDY

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Inflammatory Bowel Disease (IBD) is a chronic intestinal condition containing two major types i.e. Ulcerative Colitis (UC) and Crohn's Disease (CD) [1]. They are associated with lifetime morbidity and increased mortality even in the early course of the disease. There is evidence for an increasing incidence of these maladies in many countries, a finding detected also in Iranian studies. [2] At present, the immune response is targeted as the most important mechanism by most therapeutic or preventive strategies. Despite considerable improvements, immunomodulatory drugs are expensive, frequently toxic, and are not effective in all patients. Therefore, attempts to find new remedies seem to be necessary. In this study, cardinal manifestations and clinical pattern of the disease has been searched in Iranian traditional medicine manuscripts. According to this, common signs and symptoms of UC and CD have been compared to similar those of the disease in traditional resources. Most of major manifestations in IBD e.g. abdominal pain, flatulence, GI bleeding, diarrhea, cramps, GI ulcers and intestinal perforation are mentioned through a disease called "*Sahaj-al-am'ae*" in traditional references such as "Canon" of Avicenna [3]. Among different remedies mentioned in Persian medieval resources, nowadays, usage of medicinal herbs such as Ispaghula (*Plantago ovata*) as an anti-IBD, anti-inflammatory and adjuvant therapy for diarrhea has been shown [4]. Moreover, *Plantago major* is known as an anti-inflammatory agent of mucosal layers and anti-diarrheal, and also, *Ocimum basilicum* as an anti-inflammatory, carminative and digestive agent. In this survey, the herbs above along with some other remedies against IBD in Iranian traditional medicine are discussed.

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FRUIT MICROMORPHOLOGICAL INVESTIGATION OF *ADONIS L.* (RANUNCULACEAE) MEDICAL PLANT IN IRAN

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The genus *Adonis L.* belongs to Ranunculaceae family. The *Adonis* species have variant special medicinal components and have wide distribution in through areas of Iran. Tens of cardenolids (cardic glycosids) are found in these species such as adonitoxin. The main application of cardenolids is suppression of heart tissue Na⁺ K⁺ ATPase pump which causes the decrease of heart throb and consequently treatment of heart throb. Because of diversity of amount and type of medicinal components in the members of the genus *Adonis*, the accurate taxonomic identification of species is very important. In this study macro and micro morphological properties of mature seeds of 8 taxa (species and varieties) belonging to *Adonis L.* were investigated using light and scanning electron microscopy. An identification key of studied *Adonis L.* taxa was given. Fruit micromorphology revealed results that agree with classification of the genus *Adonis* established previously on morphological ground.

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16, 17 May 2012
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ESSENTIAL OIL COMPOSITION OF DIFFERENT PLANT PARTS OF *KELUSSIA ODORATISSIMA* MOZAFF. FROM IRAN

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Kelussia odoratissima Mozaff. (Apiaceae), with the common Persian name of *Kelus* or *Karafs-e-koohi* is growing as an endemic perennial aromatic herb in the central region of the Zagros Mountains of Iran. The plant is distributed around some geographical parts of the Zagros Mountains especially Chahrmahal Bakhtiari province, where it is locally used fresh in salads, pickled, or in soups, and yogurt as dried powder. The aerial part of the plant is medicinally used as a popular anti-inflammatory, anti-tissue, and sedative. In the present study, the essential oil composition from different parts (root, leaves, stalk, inflorescence and fruits) of *K. odoratissima* is reported. The yield of oils (w/w %) obtained by hydro-distillation were in the order of: seed (1.4%) > root (1.05%) > stalk (0.37%) > leaves (0.27%) > inflorescence (0.2). The essential oils were analyzed by GC-FID-MS in respect to their chemical composition. In total, 39, 28, 36, 26, and 6 constituents were identified and quantified in the oil of root, leaves, stalk, inflorescence and fruits, respectively. (Z)-Ligustilide (54.0-86.0%) and (4Z)-decen-1-ol (2.0-12.3%) were the major compounds and totally, oxygenated sesquiterpenes were comprised the main fraction in the oil of all plant parts [1, 2].

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ANALYSIS OF VARIATION IN PRINCIPAL UNSATURATED FATTY ACIDS IN A GERMPLASM COLLECTION OF SESAME (*SESAMUM INDICUM L.*)

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Sesame seed oil is beneficial to lowering cholesterol levels and hypertension in humans and reduces the incidence of certain cancers [3]. These advantages are ascribed by low level of saturated fatty acids as well as the activity of unique natural antioxidants together with tocopherols isolated from seeds. The characterization and conservation of sesame germplasm for fatty acid compositions are essential for future use of the existing genetic resources to developing superior quality edible or industrial oils. In this study, oleic and linoleic acids content of 24 local and exotic sesame genotypes were measured by Near Infrared Reflectance Spectroscopy (NIR) system. The field layout was a randomized complete block design with 3 replications which was conducted in Isfahan University of Technology in 2009. Wide significant variation was observed in the germplasm for the investigated characters. The results confirmed that oleic acid was the major component comprising 39.6 to 50.5% of the total fatty acids. Linoleic acid in seed oil ranged from 31.5 to 47% with a mean value of 37.22%. Considering all genotypes together indicated that the total means of oleic and linoleic acids as principal unsaturated fatty acids of sesame were more than 80% of the seed oil. The highest oleic and Linoleic acid content in the germplasm was for two local genotypes, Tn234 and Yekta, respectively. Except Yekta which showed higher percentage of linoleic than oleic acid, all of other genotypes showed higher amount of oleic than linoleic acid content. Hiremath et al. [1] and Uzun et al. [2] also illustrated that Asian accessions have higher amount of oleic than linoleic acid.

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ETHNOVETERINARY SURVEY OF MEDICINAL PLANTS USED FOR THE TREATMENT OF LIVESTOCK DISEASES IN RAZAVI KHORASAN PROVINCE, IRAN

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Ethnoveterinary medicine refers to holistic and interdisciplinary study of traditional knowledge, skills, methods, practices and folk beliefs of the people about the health care, healthful husbandry and production of livestock [2]. It encompasses information on diseases and their control; remedies and clinical practices for treatment and prevention; management, feeding and breeding strategies; spiritual elements; and the human resources that hold the information and experience [1]. There have been very few studies on ethnoveterinary use of plants in different regions of Iran. This study was undertaken during 2010 to 2011 in Razavi Khorasan province, with the aim to investigate the significance of medicinal plants and their use in the treatment of different ailments in livestock. Information was obtained through structured questionnaire administered to traditional healers and herbalists in the region. The study revealed 27 plants species belonging to 18 families namely; *Apiaceae*, *Fabaceae*, *Malvaceae*, *Myrtaceae*, *Lamiaceae*, *Alliaceae*, *Brassicaceae*, *Poaceae*, *Plantaginaceae*, *Scrophulariaceae*, *Verbenaceae* and *Zygophyllaceae*. The major traditional uses were to treat livestock for ailments such as: gastrointestinal disorders, promote lactation, diarrhea, respiratory tract infection, urinary tract diseases, wound healing, vermifuge, purgative, carminative and fever. Methods of preparation and administration were found to include direct feeding of the plant parts, drenching with aqueous decoction or direct external application of plant juice on the affected parts. The present study suggested that further clinical experimentation is needed to scientifically evaluate these widely used herbal remedies for possible bioactive effects.

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STUDY ON ANTIFUNGAL ACTIVITIES OF MENTHA PIPERITA AND THYMUS VULGARIS ESSENTIAL OILS AGAINST FUSARIUM OXYSPORUM AND F. VERTICILLIOIDES, CAUSAL AGENTS OF ONYCHOMYCOSIS AND KERATOMYCOSIS

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Fusarium is a large genus of filamentous fungi widely distributed in soil. Most species are harmless saprobes, and relatively abundant members of the soil microbial community. Some species produce mycotoxins in cereal crops that can affect human and animal health if they enter the food chain. The main toxins produced by these *Fusarium* species are fumonisins and trichothecenes. Some species as *Fusarium oxysporum* and *F. verticillioides* may cause a range of opportunistic infections. In humans with normal immune systems, fusarial infections may occur in the nails (onychomycosis) and in the cornea (keratomycosis or mycotic keratitis). In humans whose immune systems are weakened in a particular way, (neutropenia, i.e., very low neutrophils count), aggressive fusarial infections penetrating the entire body and bloodstream (disseminated infections) may occurred. The object of this study was assigned to identify the effectiveness of *Mentha piperita* and *Thymus vulgaris* essential oils against 24 h cultures of *F. oxysporum* and *F. verticillioides*. The experiment was carried out with Whatman paper disc method in 25, 50, 75 and 100% concentration of essential oils on PDA culture at 25°C and mycelial growth measured daily for 20 days. Essential oil (10 µl) was directly assayed to each fungus with 25, 50 and 75% dilution with acetone and undiluted 100%. The control was used for each case by not exposing the fungus to any extract and addition of acetone. The antifungal activity was evaluated under a randomized completely factorial design with three replications. Results indicated significant decreases of 83% and 95% in the radial growth of *F. verticillioides* by *Th. vulgaris* (100%) and *M. piperita* (100%) essential oils, after 10 days, respectively. Complete inhibition of growth in *F. oxysporum* was observed by *M. piperita* essential oil in high concentrations (75% and 100%) after 7 days.

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**National Congress on Medicinal Plants
16, 17 May 2012
Kish Island**



EVALUATION OF SOME HERBAL PLANTS EXTRACTS ON CONTROL OF TOMATO ROOT-KNOT NEMATODE (MELOIDOGYNE INCOGNITA)

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Root-knot nematode (*Meloidogyne incognita*) is one of the most economically important pests in agriculture. Crops losses occur caused by this nematode every year. Different control methods have been introduced to control it but the anti-nematode effect of herbal extracts haven't been evaluated widely. In this research evaluation of some herbal plants against tomato root-knot nematode (*Meloidogyne incognita*) was done in vitro. Due to this reason, a research project with 224 treatments at 3 replication was carried under factorial design. In laboratory conditions effects of alcoholic extracts of leaf and seed oils of Chinaberry, Sweet Wormwood and Rapeseed with 0 (as control), 100, 300, 500 and 1000 ppm concentrations, were evaluated on pre-immobility second stage juveniles and hatching of eggs.

The results indicated that all herbal extracts and essential oils at all concentration levels had anti-nematode activities, more or less. But, alcoholic extraction and essential oil of Chinaberry showed 68% and 76% reduction in nematode activities of second stage juveniles. The highest concentration of alcoholic extraction of Sweet Wormwood and Chinaberry's essential oil had shown 17% and 13/67% effect in inhibiting the eggs, respectively.

IDENTIFICATION AND INTRODUCTION OF MEDICAL PLANTS AND THEIR UTILIZABLE PARTS OF KAZERUN REGION-FARS PROVINCE, IRAN

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One of the most valuable sources of natural resources in Iran is medicinal plants that the scientific knowledge, culture, development and proper utilization of them can play an important role in health, employment and non-oil exports. Medical plants species constitute a significant portion of the flora of Iran and perform a major role in the composition of different plant communities. This study was done to collect and identify medical plants in the years 2009 to 2011 in Kazerun region of Fars province that located in 135 km west of Shiraz with 4060 km² area. Altitude domain of area is between 700 to 2300 m. In this investigation according to the medical necessity of knowing the species of trees, shrubs and herbaceous, with reference to the natural areas of Kazerun city was prepared the floristic list, then by regard to library studies and consultation with experts and local persons who was aware and informed, were identified the species of medicinal plants. According to the results of obtained floristic list, observed about 300 plant species that about 100 species have medicinal uses. These medicinal plants belonged to 32 families, which the most species were in Labiatae (13 species) and Compositae (12 species) families. In addition, the *Thymus* and *Achillea* genera had the highest number of species with three one. In this paper have been studied some of the medicinal uses of these plants and their utilizable parts. Also, prepare the distribution map of medicinal plants of Kazerun region.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



BIOINFORMATICS STUDY OF THE GENE ENCODING 3-HYDROXY-3-METHYLGLUTARYL COENZYME A REDUCTASE A KEY ENZYME IN ISOPRENOIDS BIOSYNTHESIS

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All isoprenoids are biosynthesis just from two Universal C₅ precursors in plants, isopentenyl diphosphate and its isomer, dimethylallyl diphosphat. These isomers are produced via classical mevalonate pathway and deoxyxylulose 5-phosphate pathway. Seven genes and enzymes involved in the mevalonat pathway, the most important of them is 3-hydroxy-3-methylglutaryl-CoA reductase, an enzyme with rate-limiting role in the flux of mevalonate pathway. This enzyme to optimum activity utilizes NADPH and reduced thiol group. Structurally it consists of 3 domains: N-terminal with two transmembrane segments in plants, a linker region and a C-terminal catalytic domain of approximately 400 amino acid residues. Plants have small *HMGR* gene family with at least two members and different expression pattern. The C-terminal is highly conserved that make it considerable region to primer designing. This gene is regulated by developmental and environmental such as light, wound, Infection, hormones, herbicides and sterols. In this investigation it has been explored thirteen sequences of *HMGR* genes in medicinal plants. Protein-protein BLAST and multiple alignment analysis showed the deduced *HMGR*_s amino acid sequences have high homology. Phylogenic tree was constructed based on the amino acid sequences showed that all *HMGR*_s are derived from common ancestor in evolution [1-4].

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EFFECT OF NITROGEN COMPOUNDS ON PRODUCTION OF TRIGONELLINE IN HAIRY ROOT CULTURE OF IRANIAN FENUGREEK (*TRIGONELLA FOENUM-GRÆCUM L.*)

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Trigonelline is known as a valuable metabolite of alkaloids group with the therapeutic affects, especially on diabetes. In this study the effect of 3 levels of nitrogen compounds (2x, full, and half) of basic MS media including KNO₃ and NH₄NO₃ were evaluated on trigonelline production of normal and hairy roots in suspension culture. In order to hairy root induction, 2 strains of *Agerobacterium rhizogenes* (ATCC1583 and K599) via co-cultivation and injection methods were used. After appearing of hairy roots a molecular analysis by PCR and genes primers of *rolB* and *virD* was conducted to confirm insertion of T-DNA segments in root genome and that the roots were bacteria-free. Then, the hairy and normal roots for investigations of trigonelline production ability were cultured in suspension MS media and the treatments were arranged in an experimental based on Randomized Complete Block Design with 3 replications. After 28 days, the trigonelline contain of roots were analyzed by HPLC method. The hairy roots were induced in the parts of plant such as crown, stem and leaf by the both strains of bacteria. The highest amount of trigonelline contain was achieved of the hairy roots cultured in MS2x media and the lowest was achieved in MS1/2N media. (13.98, 8.74 mM/g dry mater respectively). The results indicate a main role of nitrogen compounds (especially NH₄⁺) and quick growth of hairy roots in enhancing of trigonelline production.



EFFECT OF WATER DEFICIT STRESS ON GROWTH AND YIELD OF THREE *MENTHA* SPECIES UNDER CONTROLLED CONDITIONS

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Many regions of Iran suffer of water deficit stress which affects survival, growth and yield of medicinal plants specially mint species. To evaluate the response of three *Mentha* species (peppermint '*Mentha piperita*', spearmint '*Mentha spicata*' and Wild mint '*Mentha longifolia*') to four levels of soil moisture regimes (100, 80, 60 and 40 of field capacity) a pot trail was arranged in a completely randomized design with five replications and carried out in 2010-2011 at College of Agriculture Ferdowsi university of Mashhad. In this experiment mint plants were harvested two times in a period of 7-8 months. The results showed that soil moisture regimes have significant effect on plant survival% (PS %), growth characteristics and total yield of dry matter of mint species at the both harvest. In the first and second cut PS% of wild mint and peppermint in 60% FC were decreased about 30% as compare as control treatment, but spearmint completely survived. Interaction effect of species and soil moisture regimes significantly affected number of total, lateral and tiller branches, number of leaves in mentioned branches and total yield of dry matter in both harvest. In the first harvest no. of total branches in spearmint did not impress by 60% FC, but decreased about 20% and 17% in wild mint and peppermint, respectively. While in the second harvest no. of total branches in spearmint at 60% of FC was 40% lower than control treatment and mentioned parameter in peppermint and wild mint were 73 and 93% lower than 100% of FC. The highest no. of leaves in 100% of FC in the first cut appertained to the lateral branches in all three species, but in the second cut no. of leaves in tillers in spearmint, wild mint and peppermint were 46, 48 and 100% more than lateral branches, respectively. Although in wild and peppermint the maximum yield of dry matter were obtained in 100 percent of FC in both harvest, but in spearmint the highest yield of dry matter in the first and second harvest were observed in 100 and 80% of FC, respectively. Results indicated that spearmint is more tolerant than peppermint and wildmint to water deficit stress during growing season.

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EXTRACTION OF 5- HYDROXI- 1, 4- NAPHTHOQUINONE FROM *PTEROCARYA FRAXINIFOLIA* AND TREATED AGAINST FUNGIES OF *CANDIDA ALBICANS* & *ASPERGILUS NIGER*

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Naphthoquinones are one of the groups of secondary metabolites widespread in nature. The most important higher plant families containing naphthoquinones are *Avicenniaceae*, *Bignoniaceae*, *Boraginaceae*, *Droseraceae*, *benaceae*, *Juglandaceae*, *Nepenthaceae* and *Plumbagnaceae*, they have been determined as secondary metabolism products of ctinomycetes (*Streptomyces*) and fungi (*Fusarium*, *Marasmius*, *Verticillium*) lichens and algae. In plants, they commonly occur in the reduced and glycosidic forms. The interest of many investigators in these compounds is due to their broad-range of biological activities: antibacterial, fungicidal, antiparasitic and insecticidal [1]. Because of these properties the plants containing them are used in folk medicines, mainly by natives in Asia, where especially Iranian medicine uses aerial as well as subterranean parts of these plants for hundreds years, and South America[2]. The utilizing of naphthoquinones for medicinal purposes and their occurrence in nature is reviewed and iscussed. Leaf material was collected in May 2011 from Chamestan botany station in North of Iran and dried at 40 °C with forced ventilation for 3 days before being powdered, sieved (only particles with 0.5-1.0 mm were utilized) and extracted. Extraction in Soxhlet apparatus for 5 hours demonstrates the highest efficiency to Naphthoquinones isolation from dried leaves of *pteroarya fraxinifolia* in the confrontation with static maceration or dynamic maceration [3]. Chloroform was employed as suitable solvent for naphthoquinones extractions. 5-Hydroxi-1, 4- naphthoquinone was treated against fungies of ATCC=5022(CANDIDA ALBICANS) and ATCC=5012 (ASPERGILUS NIGER)

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF UV-C RADIATION AND HEAT TREATMENT ON SOME PHYSICO CHEMICAL IN
POMEGRANATE (*PUNICA GRANATUM L.*)

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anthocyanins and other phenolic compounds of PJ have preventive and therapeutic effects on cardiovascular disease, inflammation and different cancer types[1]. The primary objectives of our study were to subject pomegranate juice to UV- C irradiation and determine the changes in anthocyanin contents and some physicochemical characteristics of PJ. thermal processing (pasteurization) is the most commonly used preservation technique to extend the shelf life of juices . However , this process may have adverse effects on sensory and nutritional values of juices[2]. The results were compared with control (untreated) and heat treated juice samples. UV- C treatment preserved the major quality characteristics of pomegranate juice better than heating process. After UV- C treatment, antioxidant capacity of pomegranate juice did not change significantly. and decrease in individual anthocyanin pigments did not change significantly. There were no significant changes in antioxidant capacity of PJ after UV-C and heat treatments. The effectiveness of the UV-C system on the mould respectively.

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ETHNOBOTANY OF PLANTS USED BY SOUTH KHORASAN PROVINCE PEOPLE IN ORDER TO
DIARRHEA AND IRREGULARITY TREATMENT

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This paper reports the results of an ethnobotanical survey of medicinal plants used by people from South Khorasan Province (Birjand), in order to treatment diarrhea and irregularity. According to this research, 17 genera from 10 families have been discovered to have medicinal uses for these sicknesses, from many centuries ago. These families consist of Asteraceae, Brassicaceae, Chenopodiaceae, Labiateae, Moraceae, Polygonaceae, Rosaceae, Solanaceae, Vitaceae and Zygophyllaceae. Different parts of these plants are used as medicine such as shoot (20%), root (15%), leaf (5%), and flower (10%). Fruit (30%) and seed (20%). All of these are edible in different manner: scald with water (13.04%), fresh (13.04%), decoction (13.04%), eaten powder with water (8.7%), paste (8.7%), eaten as food (8.7%), water extract with candy (8.7%), eaten with water (4.35%), eaten with cool water and candy (4.35%), eaten powder with milk (4.35%), eaten with warm water (4.35%) and eaten powder with yoghurt (4.35%).

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



IN VITRO EFFECTS OF AQUEOUS *FERULA ASSA-FOETIDA* EXTRACTS ON LEISHMANIA MAJOR PROMASTIGOTES

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The old traditional phyto-medicine asafetida, an oleo-gum-resin obtained from the roots of different *Ferula assa-foetida*, is used in different countries for various purposes. Asafetida is not only used as a culinary spice but also traditionally used to treat various diseases, including asthma, gastrointestinal disorders, intestinal parasites, etc. This oleo-gum-resin has been known to possess antifungal, anti-diabetic, anti-inflammatory, anti-mutagenic and antiviral activities. A wide range of chemical compounds including sugars, sesquiterpene coumarins and polysulfides have been isolated from this plant [1]. Cutaneous leishmaniasis is the most common form of leishmaniasis. It is a skin infection caused by a single-celled parasite that is transmitted by sand fly bites. Cutaneous Leishmaniasis is a major worldwide health problem. The drugs of choice for their treatment are still problematic in this case, and therefore there is an urgent need to discover new drugs with high activity and low side effects. Natural products have become a key source of new drugs in the last years. Advances in the research of natural products for the treatment of leishmaniasis have been recently reviewed.[2] In this study we want to evaluate the anti-Leishmanial activity of aqueous extracts of *Ferula assa-foetida*, *in vitro* promastigote stages of *L. major* (MRHO/IR/75/ER) were transferred to RPMI-1640 medium, supplemented with 10% fetal calf serum (FCS) and antibiotics then grown at 25±2°C. The IC₅₀ values (50% inhibitory concentrations) were determined; accordingly. All experiments were repeated in duplicate. Aqueous extracts of *Ferula assa-foetida* inhibited the growth of promastigote forms of *L. major in vitro* after 72 hours of incubation. IC₅₀ values of aqueous extracts of *Ferula assa-foetida* is 3.6 µg/ml. The present results indicate that post-treatment administration of different doses of aqueous extracts of *Ferula assa-foetida* attenuated the number of *Leishmania major* promastigotes.

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EVALUATION OF FENNEL (*FOENICULUM VULGARE*) EXTRACTS ON TACHYZOITE OF *TOXOPLASMA GONDII* IN BALB/C MICE

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Fennel has been shown to contain antioxidant substances [1]. *Toxoplasma gondii* is one of the most important apicomplexan parasites of humans and other warm-blooded animals. Current toxoplasmosis treatment for patients such as pregnant women is based on the administration of spiramycin or a drug combination as sulphadiazine-pyrimethamine-folinic acid (SPFA) in cases of confirmed fetal infection. However, these drugs are few tolerated and present many disadvantages due to their toxic effects to the host.[2] We have studied the effect of Fennel (aqueous – ethanol - acetone) extracts on tachyzoite of *Toxoplasma gondii* in female BALB/c mice. A total of 70 BALB/c mice (control & experiment) were included, and 10000 *Toxoplasma* organisms of the RH strain *Toxoplasma gondii* were given intraperitoneally to each mouse. Fennel (Aqueous – ethanol - acetone) extracts were administered in 7 groups. All of the experimental mice were given extracts intraperitoneally with 100 or 500 µl/kg/day single dose 3 hours after injection. One hundred percent of mice survived with all of the used dosages of Fennel (aqueous – ethanol - acetone) extracts at 5 days after infection but one hundred percent of positive control mice died. Comparing groups, tachyzoites of *Toxoplasma* in the spleen were disappeared in the group that received aqueous Fennel extract (40%). In comparison of control group with all experimental groups, eradication of *Toxoplasma*'s tachyzoites from the spleen (P<0.001) and liver (P<0.05) were significant. The results show that Fennel (aqueous – ethanol - acetone) extracts are effective on tachyzoites of *Toxoplasma* in mice.

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EFFECT OF HYDRO-ALCOHOLIC EXTRACT FROM *BRUNELLA* AND *ADIANTE CAPILLAIRE* ON CALCIUM OXALATE CRYSTALLIZATION IN-VITRO

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Use of herbal medicine is a remedial method for treatment of kidney stones in Iranian traditional medicine. In order to being a therapeutic-hygienic problem for treatment of kidney stone, using herbal medicine will be effective and appreciable. *Brunella* and *Adiantum capillare* are two medicinal plants which had been used for kidney disorders and excretion of bladder stones in traditional references. In this study effect of hydro-alcoholic extract of these two herbs on crystallization of calcium oxalate in vitro were investigated. Extracts of every herb were provided in the concentrations of 0.25, 1 and 2 mg/ml, at first. Precipitation of calcium oxalate had been induced by adding sodium oxalate (0.1 molar) to the urine samples of 10 adult and healthy persons in two groups (by and without adding of extracts). Presence of calcium oxalate crystals were evaluated immediately and 24 hours after induction. Crystal development was evaluated by numeration of them and spectrophotometry. Extract of *Brunella* has been decreased number of crystals against control group in 0.25, 0.5 and 1 mg/ml concentrations significantly ($P < 0.05$) and were increased number of mono hydrate calcium optical but *Adiantum capillare* in none of concentrations has been decreased this index ($P > 0.05$). Index of turbidity by spectrophotometry in none of extracts showed significant difference between case and control groups ($P > 0.05$). Current evidences of this study showed that extract of *Brunella* lead to prevention of composition of crystals and it can inhibit creation of kidney stone probably by increase in number of mono hydrate crystals. Animal studies for confirmation of this effect will be offered. [1, 2].

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EFFECT OF CHEMICAL AND PHYSICAL FACTORS TO IMPROVE THE SEED GERMINATION OF *SATUREJA KHUZISTANICA* JAMZAD. AND *SATUREJA RECHINGERI* JAMZAD

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Satureja khuzistanica and *Satureja rechingeri* are two valuable medicinal species that the domestication process has started recently. Determination of the best pretreatments to increase the rate and percentage of seed germination is an important step for the domestication and breeding. For this, the mature seeds of both species were collected from Khorramabad in western of Iran in 2010. Seeds of both species were subjected to different treatments including various levels of GA₃ (250 ppm, 350ppm, 500ppm), KNO₃ (2%, 4%), moist chilling (5°C) (7 and 10 days) in a Completely Randomized Design (CRD) with three replications. Maximum germination percentage of both species was observed at 250 ppm of GA₃ (72.5%) and moist chilling (5°C for a period of 7 days) (55%). The highest germination rate was observed at GA₃ (500ppm) with moist chilling (5°C for a period of 7 days) (0.165) and GA₃ (250ppm)(0.159). Germination in *S. rechingeri* was significantly ($P < 0.05$) higher than *S. khuzistanica*. According to the results of present work, GA₃ (250 ppm) and moist chilling (5°C for a period of 7 days) are suggested as suitable treatments for seed germination enhancement of both species.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



CHEMICAL CONSTITUENT VARIATIONS IN THE ESSENTIAL OIL COMPOSITIONS OF GERMPLASM COLLECTION OF *ORIGANUM VULGARE* L.

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Origanum vulgare L. is a perennial herb belonging to the family *Lamiaceae* used as folk medicine because of the essential oils produced in the aerial parts [1]. Aromatic leaves and inflorescences of plants are widely used as a popular spice in food industry [2]. The biological activity of essential oils and herb extracts causes a high pharmaceutical and industrial interest in *O. vulgare*, since antimicrobial, antifungal, insecticidal and antioxidative effects have been reported [3]. *O. vulgare* is the most variable species of the genus *Origanum* and the only one commonly known as 'oregano' in most European countries [1]. Forty two accessions of *Origanum vulgare* L. mostly originated from Europe (39 accessions from the Gatersleben Genebank, IPK, Germany along with three cultivars) were evaluated to access phytochemical polymorphisms. Dried leaves and inflorescences were hydro-distilled for 3h. A total of 62 volatile compounds were detected in essential oils by gas chromatography–mass spectrometry (GC–MS). For quantification purposes, percent values of peak areas were determined by gas chromatography–flame ionization detector (GC–FID) and 18 major compounds were investigated. The chromatographic fingerprints showed the presence of high intraspecific diversity of chemical constituents in the essential oils from the accessions of *O. vulgare*. Dominant components in essential oils, that determine different chemotypes, were four monoterpene including carvacrol, thymol, p-cymene and γ -terpinene and two sesquiterpenes including β -caryophyllene and Germacrene-D. Principal components analysis (PCA) confirmed also this broad phytochemical variation among accessions. The results provide a solid basis for breeding of pharmaceutical and spice qualities of *Origanum vulgare* L.

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ANTIFUNGAL ACTIVITY OF FENNEL ESSENTIAL OIL (*FOENICULUM VULGARE* MILL.)

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This study was aimed to evaluate the mycelium growth inhibition properties of essential oil of Iranian fennel. The fennel essential oil from ecotype of Khash (*Foeniculum vulgare* Mill.) was applied against one species of tomato pathogenic fungi; *Fusarium oxysporum* f. sp. *lycopersici*. The mycelium growth inhibition techniques were applied to record the efficiency of this essential oil at 15, 75, 150 and 300 ppm while unused amount of these oils were used as the control. The experiment was conducted in vitro, using potato dextrose agar (PDA) under Complete Randomized Design with 3 replications. The data of mycelium growth inhibition were recorded at 7 days after inoculation at 25±2°C. The results showed that Fennel essential oil at a concentration of above 75 ppm had the strongest mycelium growth inhibition (more than 90%) of *Fusarium oxysporum* f. sp. *lycopersici*., whereas 15 ppm levels were ineffective (less than 10%). The analyses show that fennel essential oil depending on the doses, exhibited different degrees of fungistatic activity.



**National Congress on Medicinal Plants
16, 17 May 2012
Kish Island**



CLASSIFICATION OF SOME IRANIAN CHAMOMILE GERMPLASMS USING ISSR MARKER

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The harmful effects of chemicals and the side effects of chemical drugs on human health have a widely focused global attention on herbal drugs and medicinal plants. The increasing use of medicinal plants in the world is more than enough to show the significance of cultivating and producing such plants. Chamomile (*Anthemis* L.) is the second largest genus in the Asteraceae family that includes about 130 species around the world. In this study, eighteen chamomile genotypes collected from various regions of Iran were investigated using ISSR (Inter Simple Sequence Repeat) molecular markers. DNA was extracted from young and fresh leaves using modified CTAB method. In the experiment, 13 primers were used. The results indicated that 10 random primers produced suitable polymorphism. 169 amplified fragments were shown in which 151 were polymorphic (89.35%) while 18 were monomorphic (10.65%). P14 and P13 primers produced the highest and the lowest number of polymorphic bands, respectively. The size of generated fragments was from 0.25 to 2 Kb. The average polymorphic bands number for each primer was 15.1. Genotype clustering was done based on band presence (1) and absence (0) using UPGMA method and Jaccard similarity coefficient by SPSS (Version 10.0) software. The investigated genotypes stood in 5 groups. Similarity among genotypes varied from 10 to 100% with an average of 41%. Minimum similarity estimated was between *A. nobilis* Golestan 2 and *A. sp Qom* genotypes while maximum belonged to *A. mazandaranica* Kiasar and *A. mazandaranica* Baladeh. The results showed that there is enough suitable diversity among chamomile genotypes that can be used for different purposes in chamomile breeding programs. Furthermore, the results indicated that ISSR marker is a suitable technique for classification as well as investigation in chamomile genotypes.

STUDY OF DRYING OF FENNEL LEAVE WITH INFRARED DRYER

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Fennel is one of the oldest herbs and possesses appealing flavor and beneficial medicinal effects. Fennel (*Foeniculum vulgare* Mill.) belongs to the Apiaceae family, is a biennial or perennial herb up to two meters high, and has feathery leaves and golden yellow flowers. Fennel is used for various purposes in the food, cosmetic, and medical industries. Today in many countries from china to Egypt and America and from Russia to Italy and Africa is cultivated. The vegetative parts of the plant are used as a green salad, fruits are used as spice, and the essential oil is added to perfumes, soaps, pharmaceuticals and cosmetics. Fennel essential oil (present in leave and seed) is also used to flavor prepared foods including meats, ice cream, candy, baked goods and condiments with antioxidant, antibacterial, anticancer and antifungal activity. One of the common uses of fennel is its leave as fresh and dried. One of the most important ways to reduce the moisture content of food, fruits and vegetables for long period maintenance is drying. One of the important types of high efficiency dryer is infrared dryer that compared to hot air dryer; it dries the food with higher quality. Infrared dryer has some advantages: 1-reduces drying time 2-high energy efficiency 3-high quality of products 4-uniform temperature in dried products 5-require less to air flow through the products. Regarding to importance of drying of fennel leave and using infrared dryer, we decide to study of synthetic measurement and identification of drying curve and also considering of different parameters like Effective moisture diffusivity, drying rate and finding best situation for drying of fennel leave. Temperature levels were 45 in 120 min, 55 in 80 min and 65°C in 20 min. According to results, at 65°C in 20 min has highest amount of D_{eff} with final value of activation energy. Hence drying of fennel leave at 65°C within 20 min has best result.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EVALUATION OF ESSENTIAL OIL CONTENT AND COMPONENTS IN IRANIAN FENNELS (*FOENICULUM VULGAER MILL*)

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Fennel is one of the oldest herbs and possesses appealing flavor and beneficial medicinal effects. Fennel (*Foeniculum vulgare* Mill.) belongs to the Apiaceae family, is native to Mediterranean regions, is a biennial or perennial herb and has feathery leaves and golden yellow flowers. Fennel essential oil and seeds are used to flavor prepared foods including meats, ice cream, candy, baked goods and condiments. An important elements of Fennel essential oil include 1-Trans Anethole that is aromatization in food and perfumes, anti-flatulence agent in herbal medicines as well as a Phytoestrojen, 2- Methyl Chavicol used in perfume industry, 3- Limonene as resins and solvents, and as a precursor carovone also anticancer property and 4-Fenchon as antidepressants are frequently used. The increasing commercial value of fennel necessitates the need to develop elite ecotypes with high essential oil content and other desired breeding and market traits. In this study fifty ecotypes of Fennel from different part of Iran were collected and some traits like number of days to 70% pasty seed and essential oil content in two years and essential oil components were studied. The stage of pasty seed is the best time for essential oil extracting with highest quantity. The results indicated that Ecotypes of Sari, Kaleibar, Qazvin, Chahestan and Haji abad long term, ecotypes Moqan, Kohin, Meshkin shahr, Alamot, Khalkhal, Damavand, Ardabil, Marvdasht, Kashan, Givi, Khash and Fozve are middle term plants, while the remaining ecotypes were short term plants. As average in two year, ecotypes with higher essential oil content than 3.5% per dry mater including Razan, Fozve, Marvdasht, Kashan, Sari, Kaleibar and Arak (3.96, 3.69, 3.68, 3.66, 3.65, 3.65 and 3.54% respectively). The GC-MS results showed that maximum value of Limonene to ecotype of Sanandaj, maximum value of Fenchone to ecotype of Sari, maximum value of *trans*-Anethole to ecotype of Meshkin shahr and maximum value of Methyl Chavicol is belonged to ecotypes of Sanandaj and Sari.

EVALUATION OF HERITABILITY OF MORPHOLOGICAL TRAITS, SEED YIELD AND ESSENTIAL OIL CONTENT IN IRANIAN FENNELS (*FOENICULUM VULGAER MILL*)

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Fennel (*Foeniculum vulgare* Mill.) is used as medicine and food additives. This species is widely spread in our country. Applying plant breeding techniques is promising for producing better genotype which can be released as high yield cultivars. Among Iranian accessions there is no information about genetic variances and heritabilities. An experiment with three replications and 50 fennel accessions collected from different parts of Iran were conducted at college of Abouraihan, University of Tehran. During two years (2010-2011) morphological traits, seed yield and essential oil content were measured. The contributing traits to seed yield and essential oil content were determined using stepwise regression. Broad sense heritability (H_b) of independent traits in model was estimated in each year separately and in multiple year experiment. The highest and lowest H_b in first year was belonged to Days to 70% seed pasty (0.99) and Number of inflorescences (0.75), respectively while the H_b for seed yield and essential oil content were 0.88 and 0.74, respectively. In second year the maximum and minimum heritabilities were estimated for days to 50% flowering (0.99) and Length of middle internodes (0.69), respectively. In this year the heritabilities for seed yield and essential oil content was 0.90 and 0.98, respectively. Altogether the results showed that heritabilities were increased in second year. Because of severe year*genotype interaction the H_b estimates were very diverse in multiple year experiment where the highest H_b for Days to 70% seed pasty was 0.90 and the lowest was for essential oil content with 0.46. Also the seed yield heritability was 0.63. So considering high estimates for yield and essential oil content affecting traits they can be utilized as indices for plant improvement in plant breeding projects. In conclusion the results showed that there is a high genetic diversity among accessions and seed yield and essential oil content can easily improve.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF PELLETTED ANIMAL MANURE AND UREA AND MICROELEMENTS ON OIL
CONTENT AND COMPONENTS IN PUMPKIN

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In order to examine the effects of animal manure and Urea as pellet and microelements on oil content and components in pumpkin (*cucurbita pepo var styriaca*), Split plot experimental design based on a randomized complete block with three replicates were conducted. The animal manure and Urea as pellet with four levels (150 Kg Urea (not pellet), 50 Kg Urea+3.5 tone animal manure, 100 Kg Urea+1.5 tone animal manure and 150 Kg Urea+1.5 tone animal manure) as main factor and microelements with three levels (1000 ppm, 2000 ppm and 3000 ppm) including Iron (Fe), Zinc (Zn), Manganese (Mn) and Boron (B) as minor factor were considered. The analysis of variance showed that in oil content, there are significant differences among levels of main and minor factors at 1% probability, and there is no interaction effect between main and minor factors. Results showed that the highest amounts of oil content (45.14%) belong to treatments of 3.5 tone animal manure+50 Kg Urea as pellet and 2000 ppm of microelements (45.14% and 46.56% respectively). The GC-analysis result showed, in 3.5 tone animal manure+50 Kg Urea as pellet with 3000 ppm of microelements had highest (88.64%) amount of unsaturated fat. The highest amounts of linoleic acid (56.86%) and oleic acid (34.28%) were obtained from 1.5 tone animal manure+150 Kg Urea as pellet with 2000 ppm of microelements and 3.5 tone animal manure+50 Kg Urea with 1000 ppm of microelements. The highest amounts of palmitic acid (11.57%) and stearic acid (2.23%) were obtained from 150 Kg Urea with 2000 ppm of microelements and 150 Kg Urea with 3000 ppm of microelements. According to none significant difference in oil contents of 1.5 tone animal manure+100 Kg Urea as pellet and 150 Kg Urea not pellet treatments, it is highly recommended that by using of animal manure and Urea as pellet, without losing oil yield, the aim of reduction of Urea consumption can be achieved.

EVALUATION OF MORPHOLOGICAL DIVERSITY IN IRANIAN FENNELS
(*FOENICULUM VULGAER MILL*)

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Iran is known, as a main producer of Fennel. Fennel is one of the oldest herbs and possesses appealing flavor and beneficial medicinal effects. Fennel (*Foeniculum vulgare* Mill.) belongs to the Apiaceae family, is native to Mediterranean regions, is a biennial or perennial herb up to two meters high, and has feathery leaves and golden yellow flowers. Fennel is used for various purposes in the food, cosmetic, and medical industries. In this study fifty ecotypes of Fennel (*Foeniculum vulgare* Mill.) from different part of Iran were collected and some morphological traits in two years were studied. The principal component and factorial analysis were conducted. The principal component analysis showed in first year 59% and in second year 57% of variance was counted by two components that based on these two components, the ecotypes in term of morphological traits were comprised. The factorial analysis showed that in both years, variance was counted by 6 factors that the first factor called characteristics of vegetative traits and period of growth and second factor called characteristics of reproductive traits. The results of factorial analysis showed that the selection to increase first and second factors including day to 50% flowering, 70% pasty and 70% dried seed, number of leave, number of node, length of petiole, weight of dry biomass, height of plant and stem diameter that jointly correlated with seed yield and essential oil content can be useful. Finally regarding to present morphological diversity in Iranian fennels, we can say Iran has a one of most reach genetic reserves of fennel that this is primitive and main stock for breeders.



COMPARING AND INVESTIGATION OF NEUROPROTECTIVE AND PROTECTIVE EFFECT OF ALCOHOLIC EXTRACTS OF *POD PROSOPIS FARCTA* PLANT ON NUMERICAL DENSITY OF THE ALPHA MOTONEURON AND NEUROGLIA CELL SPINAL CORD AFTER SCIATIC NERVE INJURY IN RATS

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Compression is one the factors that causes the degeneration of the cell body of spinal cord. *Prosopis farcta* is a member of leguminosae family and mimosaceae subfamily. Thus the purpose of this study was to investigation the effect of the pod *prosopis farcta* plant, on numerical density of the alpha motoneuronal and neuroglia cell spinal cord after sciatic nerve injury in rat. At first the alcoholic extract of the *prosopis farcta* were provided by the soxhlet method. 18 heads the male wistar rats with about three months old and 300 – 350 gr weight were kept in special condition. Then they were divided into 3 groups. After anesthetizing the rats, the muscle of thigh was splited and the sciatic nerve was kept under compression, then the muscle and skin were stitched. In the care groups two weeks after compression the alcoholic extract of the *prosopis farcta* was injected to the rars with 50mg/kg dosage by the intrapritoneal way. (injecting weekly).After 28 day of compression , under the perfusion method samples were taken of lumbar spinal cord and after tissular processes ,slids 7 micron were provided of the samples serialy. Then they were colored by toluidin blue and erithrosin .some photos were taken and numerical density of the alpha motoneurons and neuroglia cell spinal cord were calculated by the estriology methods and the data were compared by the statistical methods(1). Calculated alpha motoneurons: The results show that the neuronal density in the compression groups decreased significantly in compare to the control groups ($p<0/001$) and in all experimental groups that received the alcoholic extraction the neuronal density has a meaningful increase in compare with the compression group($p<0/05$). Calculated neuroglia cell : The results show that the numerical density in the compression group increased significant in compare to the control group($p<0.01$) and in experimental group that received the alcoholic extraction the numerical density dosnt show decrease than the compression group and this result isn't significant. Alcoholic extract of this plant is devoid of protective effect but this extract has neuroprotective effects.

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IN VITRO ESTABLISHMENT AND PROLIFERATION OF *VACCINIUM ARCTOSTAPHYLOS*

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Vaccinium arctostaphylos L. (Ericaceae family), locally named Qare-Qat is a shrub or woody bush which has been extensively used in Iranian folk medicine as antidiabetic and antihypertensive agents for many years(1). In the present investigation, a protocol for micropropagation of *V. arctostaphylos*, using terminal and lateral nodes from Kelardasht and Asalem forests was developed. Nodal segments were taken from the collected stems. They were surface sterilized and transferred to different culture media. Interactive effects of plant growth regulators (zeatin and IBA) were used to optimize in vitro propagation of *V. arctostaphylos* (establishment and shoot proliferation). The experiments were analyzed in factorial based completely random designs. Each experiment was repeated five times. Analysis of variance was performed and comparisons of means were conducted using Duncan's Multiple Range Test ($p \leq 0.01$). The results showed that the best media for establishment of Kelardasht and Asalem explants were media supplemented with 1 and 4 mg l⁻¹ zeatin, respectively. In Kelardasht explants, an average maximum number of shoots was obtained in medium containing 2 mg l⁻¹ zeatin. Whereas, the highest number of shoots for Asalem explants was achieved in medium supplemented with 0.4 mg l⁻¹ IBA and 2 mg l⁻¹ zeatin.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF WEED AND DIFFERENT LAYERS OF NITROGEN FERTILIZER ON CHLOROPHYLL CONTENT IN BASIL (*OCIMUM BASILICUM*) INTERCROPPING WITH COWPEA (*VIGNA UNGUICULATA*)

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Chlorophyll content is one of the most important crop biophysical characteristics. These pigments can be related to photosynthetic capacity and productivity of a crop at developmental stage and canopy stresses. Accordingly, the objective of this study was to quantify and characterize the spatial variation of Chlorophyll content in basil. The experiment was conducted as additive design using a split split plot arrangement based randomized complete block design with 3 replicates during 2010. Weeding vs non-weeding and nitrogen levels (0, 50 and 100 kg urea ha⁻¹) were assigned to the main plots and sub plot, respectively. Basil and cowpea ratio including 100% basil; cowpea 100% + basil 25%; cowpea 100% + basil 50% and cowpea 100% + basil 75% were arranged in sub sub plots. The studied treatments had a significant effect on chlorophyll content. Increasing of nitrogen fertilizer markedly enhanced the chlorophyll content in monoculture and intercropping. Maximum chlorophyll was obtained when basil plant by 25% and cowpea by 100% were intercropped. Weed interference and monoculture, however, reduced chlorophyll amount in both plants. Number of weed species in basil monoculture was greater than intercropping leading to a reduction of leaf chlorophyll due to increasing competitiveness and decreasing nitrogen transmission to the tissues and changes in nitrate reductase enzyme activity. The cowpea as a cover crop provides good coverage at 100% density and prevented weeds germination and their growth and expansion. Finally, the results showed that the amount of chlorophyll depends on weeds density dynamics and would be decreased due to competition and less allocation of assimilates and production of pigment such as chlorophyll [1, 2, 3, 4].

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EVALUATION OF ANTIMICROBIAL EFFECT OF *AMMI VISNAGA* AGAINST ORAL STREPTOCOCCI

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Some species of streptococci have great role in dental caries. So control of their activities can promote prevention of dental caries. Use of herbal agents is a notable issue in recent researches. The aim of this study was evaluation of antimicrobial activity of aqueous and hydroalcoholic extract of seed and stem of *Ammi visnaga* against *Streptococcus mutans*, *Streptococcus salivarius* and *Streptococcus sanguis*. First step or screening was designed by determination of antimicrobial activity for each extracts using Disk diffusion method. For those extract which presented it; "no growth halo" was evident around related paper disks. Next step was determination of MIC (minimum inhibitory concentration) and MBC (minimum bactericidal concentration) corresponding to modified macrodilution method for those extracts revealed antimicrobial activity. "No growth halo" was obvious around *S. sanguis* and it was absent around *S. salivarius*; For *S. mutans*, only aqueous seed extract produced the halo. MIC and MBC of aqueous and hydroalcoholic stem extract against *S. sanguis*, were 5 and 7%, stem extract against *S. sanguis* as well as hydroalcoholic seed extract against *S. sanguis*, 5 and 5%, aqueous seed extract against *S. sanguis*, 15 and >30% and aqueous seed extract against *S. mutans*, 20 and >30%, respectively. *A. visnaga* revealed antimicrobial activity against some species of oral streptococci including *S. mutans*. So, we can use it for prevention of dental caries but further investigation is recommended.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



PHYTOCHEMICAL AND ANTIOXIDANT ACTIVITY IN DIFFERENT PARTS OF *MYRTUS COMMUNIS* RECH.F. IN NORTH OF IRAN

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Myrtus communis Rech. F. (Myrtaceae) with locally known as "Murd" is one of the most important steppe medicinal shrub in north of Iran, which has been used as anti-inflammatory, anti-allergic, anti-thrombotic, anti-mutagenic, anti-septic, anti-allergenic, antimutagenic, antibacterial, antioxidant, antifungal and anti-apoptosis [1,2]. In this research due to study of the relationship between the most important secondary metabolites content (phenol, flavonoid) and their antioxidant activity of plant, different parts were collected from Maraveh Tappeh region in different growth period (May-October 2011). The samples were dried and extracted by methanol. Total phenolic (Tp) and total flavonoids (Tf) content were determined spectrophotometrically and their antioxidant activity were measured by 1,1-diphenyl-2-picryl hydrazyl radical scavenging (DPPH) method. These findings indicated that the Tp contents had range from 9.51 ± 1.5 to 13.74 ± 0.7 mgGAEg⁻¹ and Tf contents were between 4.15 ± 0.5 to 119.15 ± 8.5 mgQuEg⁻¹. Antioxidant activity (IC₅₀) was measured in ranges 175.39 ± 15.9 to 263.74 ± 252 mg/ml. Analyses of these results showed that there was a positive correlation between antioxidant activity and secondary metabolites content and the leaves extract with the highest content of Tp and Tf compounds have better antioxidant to compare another parts. Our obtained which could confirm the traditional uses of this plant to treatments of many current disorders. We offer to another research about investigation effect of various solvent in release of secondary metabolites in different parts of this plant and survey of their medicinal effects in vivo and clinical models.

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THE ANTI-CANCER EFFECT OF "PEGANUM HARMALA" ALKALOIDS

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β-carbolines like harmaline and harmine are the major alkaloids presenting in the seeds of the *Peganum harmala*. These substances have attracted significant attention due to their anticancer properties. *P. harmala* is a native plant of Iran which is traditionally and commonly used for medicinal and psychoactive purposes since ancient times. In this study we extract harmaline and harmine from *P. harmala* and the contents of the extract were determined using FT-IR and HPLC method. The dose effect of harmaline and harmine was studied by incubating the breast cancer cells with 1–100 μg/ml of the harmaline and harmine for 5 days. The MTT study showed that harmaline and harmine reduced proliferation and viability of the MDA-MB-231 cells dose and time-dependently. These results confirm the anticancer role of harmaline and harmine.

ECONOMICAL STUDYING ON TWO SPECIES OF HERBAL PLANTS *FOENICULUM SP* AND *CUMINUM SP* IN ILAM.

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Nowadays, cultivating herbal plants is increasing in different countries because of peoples tendency toward using them again. Because of many reasons, it's not possible to produce most of herbal plants just by picking them up from natural resources. Studying the production and export of herbal plants in Iran clarifies the necessity to cultivate them. Cultivating the mentioned plants was done after studying about them. Then the appointed factors were analyzed through interview with cultivators and questioners. After considering the possibilities, cultivation started. Studying and economical justification is needed in order to make decision and have plans based on cost and income, when we want to have form production of such plants. In this study by doing the mentioned stages, two species of *Foeniculum sp* and *cuminum sp* were planted in Malkhshahi by using preservation method and their costs and benefits have been studied. The outcome proved economical justification for cultivators. So, by considering similar climatic situation of other town such as Ayvan, Ilam, Malkhshahi, Shirvan, it is suggested to cultivate such plants there to improve well fare of people and at the same time to devote less fertile lands to herbal planting.



National Congress on Medicinal Plants
16, 17 May 2012
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COMPARATIVE ANATOMICAL STUDY ON *PETIOLATA* AND *CHLORODICTYA* VARIETIES OF
MENTHA LONGIFOLIA (L.). HUDSON. AS MEDICINE PLANT IN KHORASAN PROVINCE

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Mentha longifolia L. belongs to the family Lamiaceae from Nepetoideae subfamily and Mentheae tribe, has 8 varieties around the world. According to the Flora Iranica reports six varieties are growing in Khorasan province [1]. *M. longifolia* is hairy perennial herb with musty or pungent odour [2]. The plant has carminative, antiseptic, antispasmodic, and stimulant, pesticidal, antimicrobial and antioxidant activities [3]. Anatomical study on stem of *M. longifolia* var. *petiolata* BOISS. and *M. longifolia* var. *calliantha* (STAPT) BRIQUET was done. *M. longifolia* var. *petiolata* are recorded for the first time in Khorasan province, moreover, comparative anatomical study on two mentioned varieties was performed for the first time. For this, cross sections of the base of stem were prepared and stained by carmine and green methyl. The results showed, differences in the type of secondary xylem, axial parenchyma, medullary rays and arrangement of vessels. Present study helped to identify varieties.

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INVESTIGATION ON *IN VITRO* ROOTING OF QARE-QAT

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Vaccinium arcostaphyllum is a member of Ericaceae family, which has been extensively utilized in ancient Iranian medicine, due to the reduction in blood pressure and diabetes. The leaf and fruit of this plant have also strong antioxidant properties [1]. Since the cuttings of the *vaccinium arcostaphyllum* do not have good rooting properties, this plant cannot be propagated through the cutting approach efficiently. Therefore, in this study we used the *in vitro* culture propagation approach for the rooting of the micro shoots of Qare- Qat. In order to do so, the shoots with budding were collected from the Aslam region. They were surface- sterilized and were transferred to the proliferation medium culture and finally to the root induction media. The micro shoots of 1.5-2.5 cm were cultured on the semi- solid medium containing active charcoal, medium with no active charcoal and liquid medium. All the media supplemented with different concentration of IBA (0, 2.5 and 10 μ M). The number of roots, length of the roots and also percentage of rooting were recorded after four weeks. The best medium in terms of the percentage of rooting, number of roots and length of the roots was the medium containing active charcoal and 10 μ M IBA, with the average of 23% rooting, 3.41 root/explants and 32.75mm length of the roots. Finally, the explants were transferred to the medium with vermiculite. The best survival percentage was achieved in the medium containing active charcoal.

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STUDY ANTIOXIDANT AND ANTI-RADICAL ACTIVITIES OF FRUITS OF TWO DISPYROS SPECIES

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Antioxidants are the main factors for neutralizing the free radicals which are active and harmful for human. Preparing antioxidation resources to reduce the effects of oxidation stress is important. Natural antioxidants have gained more importance because of their positive effects against molecular damage from reactive oxygen (ROS) and nitrogen (RNS) species [1]. The extracts and pure phenolic compounds from two dispyros species (dispyros kaki and dispyros lotus) might also be used as natural antioxidants and alternative to synthetic antioxidants such as BHT (Butylated hydroxyl toluene) and BHA (Butylated hydroxyl anisole) [2]. In the present study dispyros kaki and diospyros lotus were investigated for their antioxidant and anti-radical properties. Scavenging capacities for DPPH (2, 2-diphenyl-1-picrylhydrazyl) nitrite and superoxide radicals were evaluated [3, 4]. The methanolic extracts of diospyros kaki showed higher scavenging ability (85.367%) on DPPH radicals. The highest of scavenging ability on superoxide radicals (91.942%) was found in diospyros lotus methanolic extracts. The methanolic extracts of diospyros lotus showed higher scavenging ability on nitrite radicals (50.124%).

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**COMPARISON OF THE ESSENTIAL OIL COMPOSITION OF LEAVES AND FLOWERS OF
PHYSOSPERMUM CORNUBIENSE FROM KASHAN**

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Physospermum Cusson genus belongs to Umbelliferae family, that have important medicinal and aromatic species. In this investigation, essential oil composition of leaves and flowers of *Physospermum cornubiense* (L.) DC. from Kashan has been studied. This species has natural habitat in Javinan of Kashan. The vegetative and reproductive organs of this species were collected in spring and summer 2011 and dried in shade (at room temperature). Volatile fraction was isolated by hydrodistillation using a Clevenger-type apparatus. The analysis of the oils was performed by using GC and GC-MS. The results showed that, 19 components were identified in the essential oil of leaves of *Physospermum cornubiense*, among them, Germacrene D (%42.11), γ -Cadinene (%5.54) and Phytol (%4.79) were the major compounds. 38 components were characterized in the essential oil of flowers of *Physospermum cornubiense*, among them, Germacrene D (%52.88), Caryophyllene (%7.73) and Nonadecane (%2.38) were the major compounds.

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CARBOHYDRATE CHANGES IN ELICITED HAIRY ROOT CULTURES OF *SILYBUM MARIANUM*

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Silymarin has been identified in the seed extracts of *Silybum marianum*. It has powerful antioxidant properties and beneficial effects on various hepatic disorders and diabetic metabolic abnormalities. It also protects the cells against oxidative stress and scavenges free radicals [1]. *S. marianum* hairy root cultures have been developed as a promising alternative for silymarin production, using *Agrobacterium rhizogenes*. Genetically transformed hairy roots, caused by infection of *A. rhizogenes*, suggest attractive properties for secondary metabolite production such as fast growth and greater biosynthetic capacity for secondary metabolites production [2]. In this study, 28-day old hairy root cultures of *S. marianum* were treated with yeast extract (2.5 mg/50 ml culture) as an elicitor. The samples were harvested after 24, 48, 72, 96 and 120 h of treatment and analyzed for flavonolignans and carbohydrates (sucrose, glucose and fructose) by HPLC. The highest content of flavonolignans was observed in yeast extract treated *S. marianum* hairy root cultures after 72h. Sucrose content decreased to 0.18 mg g⁻¹DW after 48 h while glucose and fructose levels enhanced to 0.17 and 0.29 mg g⁻¹DW by 1.7 and 2 times higher than control, respectively. Sucrose content increased to 0.28 mg g⁻¹ DW after 72 h whereas fructose and glucose levels enhanced to 0.04 and 0.13 mg g⁻¹ DW at that time. It seems that yeast extract caused a metabolic reprogramming that affected carbohydrate metabolism for increasing secondary metabolite production. Yeast extract promoted accumulation of carbohydrate in hairy root cultures, thus studying carbohydrate changes can be accounted as an appropriate tool for metabolite pathway investigation.

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SALICYLIC ACID AND JASMONIC ACID AS SIGNALING COMPONENTS FOR SILYMARIN PRODUCTION IN ELICITATED *SILYBUM MARIANUM* HAIRY ROOT CULTURES

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The chemical bioactive constituent of extract from *Silybum marianum* (milk thistle) seeds is a flavolignan, silymarin, which is a strong antioxidant and hypolipidaemic agent with a potent anticarcinogenic effect [1]. Hairy root cultures have been recognized as a useful and alternative technology for silymarin production [2]. Various elicitation strategies have been developed to stimulate silymarin biosynthesis in hairy root cultures [3]. In this study, 28-day hairy root cultures of *S. marianum* were treated with methyl jasmonate (100 μM) as an elicitor. Salicylic acid (SA), jasmonic acid (JA) and silymarin content were determined at different exposure time (24, 48, 72, 96 and 120 h). The highest amount of silymarin production was observed after 48 h of elicitation. The results show that SA increased to a maximum (68.45 μg/g DW) 1.19-fold higher than the control after 24 h of elicitation. The enhanced accumulation of SA was proportional to the increase of silymarin which were 1.01 mg/g DW. JA content had an increase up to 1.67-fold after methyl jasmonate treatment after 48 h of the correspondence elicitation. SA and JA enhancement as signalling components were observed 24 h before and at the same time of maximum silymarin production. This findings can be used for improvement of metabolome engineering programs.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ANTIMICROBIAL PROPERTIES OF *TRACHYSPERMUM AMMI* L. ESSENTIAL OIL AGAINST FOODBORNE PATHOGENS

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Ajowan (*Trachyspermum ammi*) is an aromatic, grassy, annual plant which grows in the Iran, India, Pakistan and Egypt with white flowers and small brownish fruits. In Persian traditional medicine, fruits of Ajowan were used for its therapeutic effects such as diuretic, anti-vomiting, carminative and anthelmintic also smoke of this drug cleans the uterus. The objective of this study was to determine the chemical composition and antimicrobial properties of essential oil of the *T. ammi*. The chemical composition of the essential oil was analyzed by GC/MS and the antimicrobial activity of the essential oil on two gram-positive and two gram-negative pathogenic bacteria were determined by using disk diffusion agar and minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) methods. Twenty-five compounds (99.67%) were identified in the oil. The major components in the essential oil were thymol, gamma-terpinene and p-cymene with the concentrations of 41.7, 30.2 and 19%, respectively. The antimicrobial activity of the essential oil was examined against *Bacillus cereus* and *Staphylococcus aureus* as gram-positive bacteria and *Escherichia coli* 0157:H7 and *Enterobacter aerogenes* as gram-negative bacteria. In agar diffusion assay, Ajowan showed inhibitory effects against all the examined bacteria. MIC was observed at 0.104, 0.026, 0.052 and 0.052 % (v/v), respectively. Furthermore, MBC was observed at 0.104, 0.052, 0.052 and 0.052 % (v/v), respectively.

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ESSENTIAL OIL CONTENT AND COMPOSITION OF ROSEMARY (*ROSMARINUS OFFICINALIS* L.) UNDER SALINITY STRESS

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Rosemary, *Rosmarinus officinalis* L. (Lamiaceae), is an aromatic evergreen shrubby herb highly distributed in the Mediterranean region. It is a well-known and greatly valued medicinal plant that is widely used in pharmaceutical products and folk medicine. The present study was conducted to investigate the effect of salt stress at 50, 100, and 150 mM of NaCl on essential oil content and compositions of Rosemary. For essential oil extraction, the aerial parts of the plant samples were subjected to hydrodistillation and the oils were analyzed by GC and GC-MS methods. The results showed that salinity stress had no significant effect on the oil content and compositions. However, the findings of this work demonstrated that areas with high salinity levels have no adverse effects on the quantity and quality of *R. officinalis* oil and this aromatic plant can be recommended for salty soils.

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16, 17 May 2012
Kish Island



PROTECTIVE EFFECT OF HYDROALCOHOLIC EXTRACT OF GREEN TEA ON CLINICAL, ELECTROPHYSIOLOGICAL AND LABORATORY PARAMETERS IN CIRRHOTIC RATS

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Since the liver plays an important role in metabolism and excretion of metabolic waste products, therefore, liver disease, especially cirrhosis of the liver, can induce various disorders in the body [1]. Green Tea (*Camellia sineis* L) extract with strong antioxidant properties has effective role in treatment of many diseases [2]. The aim was to investigate the protective effect of hydroalcoholic extract of Green Tea on electrophysiological, clinical and laboratory parameters in cirrhotic rats. Sprague rats divided in four groups (sham, cirrhotic, cirrhotic treated with 2 doses of extract). Biliary cirrhosis in animals induced by chronic bile duct-ligation (BDL)[3]. Extract (50 and 100 mg/kg/day, ip) and saline solution (1ml/kg/day, ip) was administered for 5 weeks. Five weeks after BDL, animals anesthetized and the clinical parameters such as ascites and edema were evaluated and blood samples were collected (from heart) for measure serum bilirubin (total and conjugated) in plasma. In all groups before BDL and five weeks after surgery, lead II electrocardiogram was recorded for calculating QT interval. QT was corrected for RR interval using the Bazett's formula. Results were analyzed by using one-way ANOVA and nonparametric tests. P<0.05 was considered as significant level. After induced of BDL, bilirubin and clinical parameters such as ascites and edema in the cirrhotic group showed significantly increased compared to sham group. Bilirubin and clinical parameters such as ascites and edema were reduced in cirrhotic group treated with hydroalcoholic extract of Green Tea compared to cirrhotic group. Results showed that not significant differences QT interval between groups before intervention. After induced of BDL, QT interval in the cirrhotic group showed significantly increased compared to sham group. QT interval was reduced in cirrhotic group treated with hydroalcoholic extract of Green Tea compared to cirrhotic group. Significant decrease in bilirubin, QT interval and clinical parameters in cirrhotic group treated by hydroalcoholic extract of Green Tea suggests the protective effect of Green Tea in cirrhotic patients.

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DETERMINATION AND COMPARISON OF ANTIOXIDANT ACTIVITY OF METHANOL EXTRACTS IN KAKUTI (*ZIZIPHORATENUIR*) AND AVIASHAN (*THYMUS VULGARIS*)

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Reactive oxygen species can cause some illnesses such as cancers, nerves problems and anemia. Observations show that natural antioxidants can protect body of humans against stresses coming from reactive oxygen species. Pasture plants like Avishan (*Thymus vulgaris*) and Kakuti (*Ziziphoratenuir*) from Lamiaceae family have high amount of antioxidant activity. They have different uses such as natural or artificial utilizations in the diet of people in different countries [1]. Determination of total phenols and flavonoids, reducing power, nitrite radical scavenging, in different parts of shoot in plants of Kakuti and Avishan of Azerbaijani mountains were studied. The results showed that phenolic and flavonoid compounds, and nitrite radical scavenging in Avishan were higher than Kakuti. But total flavonoid content in Kakuti was higher than Avishan. The difference between two plants in nitrite radical scavenging and reducing power was significant.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



TREATMENT EFFECT OF PELARGONIUM ON MENOPAUSAL SYMPTOMS

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Menopausal symptoms vary markedly among women. The most common symptoms include hot flushes (often called hot flashes, but the disorder involves red "flushing" of the skin), dryness and thinning of skin and vaginal wall, mood swings, depression, and insomnia. In addition, there is often a gradual weakening of the bones (reduction of bone density) known as osteoporosis that eventually leads to their easy fracture. All of these symptoms are the result of declining levels of sex hormones, especially estrogens. Geranium also decreases nostalgia and anxiety. The goal of this study was evaluate the Treatment effect of pelargonium on Menopausal Symptoms This study was performed as literature review by searching of menopause symptom, pelargonium keywords. Traditionally geranium has been utilized since the time of antiquity for skin care, dysentery, hemorrhoids, inflammations and excessive menstrual bleeding. We would find geranium oil nowadays to have a calming, uplifting and strengthening impact particularly around the nervous system. It can be valuable oil for treating menopausal symptoms including hot flushes and vaginal dryness. The oil could be diluted having carrier oil and rubbed on the abdomen for GI disturbances. Geranium assists promote blood circulation and it promotes regular liver function. Geranium oil is most well-known for its skin care properties and is good for clearing up oily skin. The medical properties and or potential of pelargonium has been identified to include the nervous system healing and revitalization, mental anti-depressant, skin antiseptic, blood detoxification, motivation boosting, correction of severe premenstrual syndromes in ladies, getting rid of cellulite, skin rashes of fungal or bacterial causes, wounds dressing and easing the harsh effects of peptic and stomach ulcers among other extra uses. Therapeutic levels in this Rose Geranium essential oil is praised for its ability to some extend emulsify fat congested organs positively and reducing the amounts of lipids in the body and hence increased ease of metabolic flow.

Results showed that Pelargonium is effective in reducing menopausal symptoms. Rose Geranium oil is known to be helpful in regulating physical, mental, and emotional imbalances, and has a calming and uplifting result about the emotions..

USE OF HERBAL METHODS IN CHILDBIRTH AND POSTPARTUM IN MASHHAD, IRAN IN 2008

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Pregnant and lactating women frequently use herbal medicine products, because such remedies perceived as natural and therefore risk free.¹⁻² Previous studies showed a great variations with the use of different herbal methods in the various settings.³ Iran has an ancient record in traditional medicine as herbal use has been a part of Iranian health belief system. However, paucity of reliable information on the use of herbal methods among childbearing women concerns many healthcare providers in maternity field. Thus this study aimed to investigate the use of herbal methods in childbirth and postpartum, among women who had an obstetric appointment at various health centers in Mashhad, Iran. In a prospective study, 106 women from obstetrics wards at 26 health centers in Mashhad, Iran were selected through multistage sampling method. Women were interviewed on the 10th and 40th day of postpartum regarding herbal use. Several in-depth interviews helped develop a questionnaire and later piloted to establish reliability and validity. Data processed using descriptive statistic methods. The prevalence of herbal based methods use in childbirth and postpartum among study subjects was high at 88.7% for herb based diet and 59.4% for herbs or herb-based pharmacological products. The main reasons for these women to use herbal based methods were body strenght and renewal in postpartum by 81.7%, wound healing by 20.8%, to calm down and psychological relief by 22.6%, to reduce post partum bleeding 34.9% and to facilitate labor and delivery 10.4%. Eating date fruits was the most common practice reported by 73% of mothers during postpartum or delivery. Its indications for use included body renewal, prevention of bleeding and augmentation of labor contractions. Some 89% of mothers described herbal methods as somewhat to highly effective. In Iran, the prevalence of herbal use during childbirth and postpartum period is very high. Thus, clinicians should be informed to address herbal methods at each obstetric visit. Safety and efficacy of herbal methods must be explored and taught in maternal health education program.

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THE EFFECTS OF LAVENDULA ON TREATMENT OF THE EPISIOTOMY AND PAIN RELIEF

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Episiotomy rates vary widely worldwide, depending on whether the procedure is used restrictively or routinely. Rates vary from 8% in the Netherlands to 99% in some of east European countries³. Perineal trauma and pain affects the mental, social and physical well being of the woman in the immediate postnatal period^{4,5}. Postpartum pain and discomfort may persist beyond the puerperium as chronic pain and dyspareunia⁶. *Lavendula officinalis* is a herb that in the Islamic-Iranian medicine is applied as antiseptic and sedative⁵⁻⁶. But there are limited clinical evidences that support this practice. So, this study was conducted to determine the effects of lavender cream on wound and repair perineal pain of primiparous women. In this double-blind randomized clinical trial, 101 primiparous women with term pregnancy delivered at Modarres hospital in Kashmar, IRAN, were recruited using purposeful sampling, and randomly allocated into two groups of lavender cream or placebo. Data was collected by interview using Visual Analogue Scale in assessing pain and REEDA scale for wound healing. Perineal pain at the 3rd (p=0.035), 5th (p=0.09) and 10th (p=0.047) days postpartum was less in Lavender group. Discharge at 10th (p=0.006) and Approximation at 5th (p=0.001) and 10th (p=0.000) day postpartum in lavender group were significantly less than controls. There were no significant differences between two groups in Redness, Ecchymosis and Edema at 3rd, 5th and 10th day post partum. Topical application of lavender cream is effective in relieving perineal pain and episiotomy wound repair without having any important side effect.

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CHEMICAL COMPOSITION AND ANTIMICROBIAL ACTIVITY
FERULA FOETIDA (APIACEAE) ESSENTIAL OIL FROM IRAN

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For the first time, the hydro-distilled oil from the aerial parts of *Ferula foetida*, which is endemic to Iran, were analyzed by GC and GC/MS. 2,3,4-trimethylthiophene (49.0%), 2,3,4,5- tetramethylthiophene (27.6%), and elemicin (8.1%) were the main components among the fifteen constituents characterized in the oil, representing 98.1% of the total components detected. Organosulfur compounds, phenylpropenes, mono- and sesquiterpene hydrocarbons comprised 76.6%, 13.9%, 6.1% and 0.7% respectively. The essential oil exhibited moderate activity against seven bacteria and three yeasts, with inhibition zone ranging from 22 to 24 mm and minimum inhibitory concentration (MIC) values ranging from 1.9 to 3.8 mg/ml. The best inhibitory effects were against *Saccharomyces cerevisiae*.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



LIGNAN COMPOSITION IN DIFFERENT ORGANS OF *LINUM ALBUM*

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Linum album is an endemic medicinal species in Iran, which have a considerable amount of lignan compounds in its organs. Lignans are a large class of secondary metabolites in plants, with numerous biological effects in mammals, including anti-tumor and anti-oxidant activities. Podophyllotoxin (PTOX) is a lignan which occurs in wide range of plant species and is pharmacologically significance because of its anticancer activities [1]. It is used as a precursor for chemical production of some anticancer drugs such as etoposide, teniposide and etopophose. In this research, amounts of podophyllotoxin, 6-Methoxy podophyllotoxin, other related lignans and lignin, were determined in different organs of *Linum album* collected from taleghan, damavand and lashkarak in Iran. Results showed that the level of podophyllotoxin was significantly greater in flowers compared to the root and leaves. Level of 6-Methoxypodophyllotoxin and lignin were significantly greater in root compared to the flower and leaves. It seems that high accumulation of podophyllotoxin in flower caused to prevent the formation of 6- methoxypodophyllotoxin. This suggests that flowers are the storage organs of podophyllotoxin of *Linum album*. Concentration of Larisiresinol and pinoresinol weren't different in organs of *Linum album*.

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IN VITRO ANTI-HERPETIC (HSV-2) ACTIVITY OF A METHANOL EXTRACT OF *SECURIGERA SECURIDACA*

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Securigera securidaca (Fabaceae) is an annual herb occurring wild in West Asia, Europe and Africa. It is locally known as goat pea and popularly named “Gandeh Talkheh” in Persian. In folk medicine of Iran, the seeds of this plant were used for treatment of various diseases such as hyperlipidemia, diabetes and gastric reflux. Herpes simplex virus-2 (HSV-2) is an important human pathogen, especially in the case of highly susceptible adults. In this study, crude methanol extract from *Securigera securidaca* were tested for antiviral activity against herpes simplex viruses by using the plaque-forming unit assay. Plaque reduction assay revealed that methanol extract reduced the plaque formation with an EC50 of <100µg/ml. Methanol extract showed no cytotoxic effects against Vero cells at concentrations of 100 µg/ml or below. In conclusion, it was revealed that the active compound in *Securigera securidaca* is non glycoside flavones (NGF) [1, 2].

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EFFECT OF ROOTSTOCKS ON NARINGIN FLAVONOIDS CONTENTS IN DIFFERENT FRUIT PARTS IN MINNEOLA TANGELO

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Flavonoids of Citrus fruits are important reserves that are used as primary materials in pharmaceutical. Naringin is bitter flavonoid which reduces blood cholesterol. The purpose of this research was the study of naringin contents in different fruit parts (epicarp, mesocarp and endocarp) of Minneola Tangelo (Citrus hybrid) grafted on the sour orange (*Citrus aurantium* L.) and Cleopatra mandarin (*Citrus reshni*) rootstocks. The experimental design was conducted at the Citrus Research Institute, Kotra, Tonekabon and Gorgan Faculty of Plant Production. A complete randomized design with a split-plot arrangement including three replications was used. In this investigation fresh weight, dry matter, total extract and naringin content were measured in Minneola Tangelo. Extraction of total extract was done by hexane and measurement of naringin used by high performance liquid chromatography (HPLC). The results showed the rootstocks had significant effects on fresh weight, dry matter and total extract of the mentioned parameters but had not significant effect on naringin content. Based on Duncan Mean Test the highest fresh and dry weights (180.42 and 68.9g respectively) were recorded in endocarp of Minneola Tangelo fruit. The greatest naringin content (1.02 %) was produced of endocarp of Minneola tangelo [1, 2].

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16, 17 May 2012
Kish Island



THE IMPORTANCE AND VARIOUS USES OF SAFFRON AND ITS EXPORT IN SOUTHERN KHORASAN

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One of the most valuable and irreplaceable medicinal plants all over the world is Saffron. Saffron is originated from iridaceae. According to some European sources, It is produced locally in Mediterranean and west Asian climate. It can be seen in arid areas of Iran with cold winter and hot summer, that is in Southern, and Razavi Khorasn. While other wild types of saffron are also used because of their beautiful decorative flowers, the common agricultural type has a particular economical value. In Southern Khorasan the ecological condition is that of a desert. Low precipitation, high evaporation causes very low humidity. Large Temperature fluctuations occur during days and nights. In some higher areas conditions are ecologically more favorable for plant growth, but they are not so distinct from those of the deserts. Some of the most important elements in Saffron are Crocin Glucosid, Crocetin, Beta & Gama Saffronol, carotene, Lycopene and Picrocin. Saffron is anodyne and it is useful for stomach. It is used to cure menses irregularities and it is useful for women's bleeding resulted from delivery. It is exhilarating and good for strengthening humans' senses and mental abilities. It is also good for Liver, spleen, headache, sleeplessness, etc. Renal stone can also be cured if used by honey.

Saffron as the most expensive agricultural and medicinal plant has a unique status among industrial and export products. Today, with %60 of the universal production, Iran is considered the main producer of Saffron in the world. Saffron's numerous qualities and uses together with the role it plays in the economy of Iranian farmers call for a particular attention to eradicate problems regarding its production, export and merchandising. Among exporting items, Saffron has a high exporting value in Khorasan, since it constituted %92 of the whole export items and %98 of the cultivated land in 2001. The high quality of Saffron produced in Iran has persuaded some European countries like Spain to buy Iran's Saffron in bulk. Later on they pack them under Spanish titles and present them to International markets. It goes without saying that they cannot produce Saffron with such Quality, since those countries lack the climatic and ecological conditions necessary to grow such a valuable product. So the Khorasanian scholars and writers should try to introduce this precious native product to the other nations based on the findings and information they have. Saffron is important from aspects of economy, medicine, producing employment opportunities and as food stuff. This article tries to describe a brief history of Saffron, explain its qualities and introduce the ecosystem of medicinal plants in Southern Khorasan. It also attempts to introduce the problems and difficulties with regard to Saffron and its export.

IN VITRO ANTIOXIDANT ACTIVITY AND TOTAL PHENOLIC CONTENT OF ZATARIA MULTIFLORA BOISS ACCESSIONS FROM IRAN

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Zataria multiflora Boiss. (Lamiaceae), with the common Persian name of "Avishan Shirazi", is an aromatic perennial shrub which grows wild, on rocky and gravelly slopes, from southern to central regions of Iran. The plant is extensively used in the traditional medicine as condiment, antiseptic, analgesic (pain-relieving), and carminative (anti-flatulence and intestine-soothing). The biological activities of the plant have also been attributed to the essential oil and extract, containing mainly phenolic compounds, such as Thymol, Carvacrol and rosmarinic acid. In the present study, *in vitro* antioxidant activity of 28 wild-growing accessions collected from the center to the south of Iran was evaluated by using 2,2-diphenyl-1-picrylhydrazyl (DPPH) scavenging assay. Total phenolic contents were also determined using a spectrophotometric technique, based on the Folin-Ciocalteu reagent, according to the method of Spanos and Wrolstad and calculated as gallic acid equivalents GAE/g dw. Total antioxidant activity varied from 3.2 to 14.9, and total phenolic content ranged from 550 to 1283 mg gallic acid/g DW. Accessions of Sirjan 1 and Abadeh showed the highest and the lowest antioxidant activity, respectively. A linear positive relationship existed between the antioxidant activity and total phenolic content of the tested accessions ($R^2= 0.79$). Therefore, *Z. multiflora* possesses valuable antioxidant properties for pharmaceutical and food industries.

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16, 17 May 2012
Kish Island



AN ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS IN THE LARGEST
KURDISH TRIBE (KALHOR)

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Medicinal plants are recognized as important sources of novel bio-molecules, which can theoretically be used in treating multiple life threatening diseases. It is thus important to document their uses because such information can help in obtaining maximum benefits from these resources and increasing the possibility of their safe and efficient use in the future. Traditional knowledge on plants used by humans is based on thousands of years of experience. By “trial and error”, people have learnt how to recognize and use such plants, including those with magical and religious functions. Knowledge of utilizing medicinal plants and their properties is passed from generation to generation. It is hypothesized that such knowledge and transmission is in danger because the communication between older and younger generations is not always assured. Ethnobotany is a very important area of study and nowadays is acknowledged all around the world. The science shows healthy relationship between humans and nature and provides possibility of finding new uses for medicinal plants. It can be used to discover new medicines derived from plants. Despite many studies on medicinal plant resources (1, 2, 3), a large number of medicinal plants and their associated indigenous applications still need proper documentation. The main purpose of this qualitative ethnomedicinal research was to identify medicinal plants and their applications in Kalhor Tribe. Data were collected using semi-structured interviews, field observations and focus group discussions in Kalhor Tribe territory located in the Gilanegharb Township, Kermanshah Province. Results showed that indigenous people have remarkable knowledge on how to use medicinal plants and plant organs (stem, root, leaf, seed, fruit) towards the treatment of diseases such as diabetes, heart diseases, and joint pain.

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THE STUDY OF ANTIOXIDANT AND FREE RADICAL SCAVENGING PROPERTIES OF PHENOLIC COMPOUNDS IN TWO VARIETIES OF URMIA GRAPE (*VITIS VINIFERA*) LEAVES

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Phenolic compounds are potentially synthesized by all plant cell types [1]. The leaves of grape (*Vitis vinifera* L.) have phenolic acids and other organic compounds that their pharmacological effects including antimicrobial and antioxidant activities that refer to phenolic compounds [2]. In this research total phenolic contents, antioxidants and free radical scavenging properties in two varieties of Ghezel ozum and Rish baba in Urmia city have been analyzed. After leaves methanolic extraction at first stage we was examined total phenolic content by using Folin-Ciocalteu's reagent [3]. We observed, total phenolic content for Ghezel ozum was 12.73 mgr/gr(GAE) and for Rish baba was 8.53 mgr/gr(GAE). We observed total phenolic content for Ghezel ozum was more. At second stage DDPH free radical scavenging activity was measured by reading the absorbance at 517 nm [4]. The inhibition percent DDPH free radical scavenging was calculated; Rish baba was 93.23% and Ghezel ozum 94.38% that variety of Ghezel ozum was more than rish baba. At third stage nitrit radical scavenging capacity determined by reading the absorbance 540 nm [5]. The percent of nitrit radical scavenging capacity was calculated; Rish baba was 28.55% and Ghezel ozum 50.75%, and again Ghezel ozum was more. Antioxidants and free radical scavenging properties for the leaves of Ghezel ozum was more than Rish baba.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



FREE-RADICAL SCAVENGING CAPACITY AND ANTIOXIDANT PROPERTIES OF THREE RAPHANUS SATIVUS CULTIVARS

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Raphanus sativus, a common cruciferous vegetable has been attributed to possess a number of pharmacological properties. Antioxidant and radical scavenging activity of *Raphanus sativus* root extracted with solvent was evaluated using different model systems. The highest scavenging of DPPH was found in *Raphanus sativus* cv. niger [1] and the lowest was found in *Raphanus sativus* cv. longipinatus. The highest and lowest phenolic contents were observed respectively in niger and *Raphanus sativus* cv. radicola [2, 3].

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COMPARISON OF ANTIOXIDANT ACTIVITY IN SEVERAL ROSA CANINA IN WEST AZARBAIJAN POPULATIONS

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It was previously reported that *Rosa canina* fruit, containing high phenolic contents, have antioxidant, antimutagenic and anticarcinogenic effects. This study was done to evaluate the amount of phytochemicals (phenols and flavonoids) content, and antioxidant of the various extracts of the fruits population of *R. canina* in west Azarbaijan [1]. The highest phenolic content was in population of Takab and lowest phenolic content was in population of Shohada Valley of Urmia [2, 3]. The highest concentration of total flavonoids was in population of Oshnavieh and lowest concentration of total flavonoids was in population of Shohada Valley of Urmia [4].

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16, 17 May 2012
Kish Island



POTENTIALS OF EXISTING PLANT POPULATIONS OF *MORINGA PEREGRINA* IN IRAN

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The only species of *Moringa* which is growing wild in South-East part of Iran, Sistan and Baluchestan, called *M. peregrina* (Forssk). Fiori. The species has several characteristics, for which various disciplines of plant science researchers particularly, medicinal plant researchers are attracted. Vast exploitation of the oil rich seeds of the species by local residents during the past decades has caused serious damages to the habitat, plant density and stands health conditions of the species [1]. Doubt in enough remaining genetic variation for the species and uncertainty on vast genetic erosion in the habitat of the species were the main reasons for performing a comprehensive research on the subject at Forests and Rangelands Research Institute and several provincial research centers. As a part of the mentioned research project, six plant populations of the species located in South part of Sistan and Baluchestan province were surveyed. A great number of single trees were sampled and evaluated based on several morphological characteristics such as plant dimensions, as well as seed yield. Habitat surveys revealed remarkable differences between the single plants and populations of the species based on the studied characteristics, so that several single plants were selected as elite plants for seed production. Geographic characteristics of the single plants were recorded for future further use of the single plants. Seeds and stems of the selected plants were sampled as well as sampling on the population basis for further greenhouse and laboratory studies. The greenhouse studies revealed different genetic architectures for the sampled populations, based on several seedling characteristics such as establishment and growth rate. Based on the laboratory studies, a great deal of variation was observed between the studied media on callus induction and growth speed of cultured micro-shoots of the samples. Based on the results of the study, it can be emphasized that there is a great potential in the valuable plant species, by which vegetative propagation of the selected high yielding single trees would end to establishment of elite plant orchards. Therefore, by vegetative propagation of high yielding single plants, through either cuttings or micropropagation, the selected single trees could be preserved and used for commercial orchard establishment. In other words, if there are commitments on *Moringa peregrina* development, it would be wise to use high yielding single plants to get much higher profits than average profit of the original population.

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MORPHOLOGICAL VARIATION IN IRANIAN NATIVE POPULATIONS OF FENNEL
(*FOENICULUM VULGARE* MILL)

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Fennel (*Foeniculum vulgare* Mill.) is an important, well-known aromatic and medicinal herb. Planting medicinal herbs dates back to thousands of years ago, however; for their genetic improvement, no considerable work has been done. At present, the number of commercial varieties for medicinal plants is low and this may preclude their adaptation and recommendation for planting in variable environments. The aim of this study was to evaluate the genetic variation in several genotypes of fennel collected from different regions of Iran base on their agronomic traits. Accessions were collected from Isfahan, Kashan, Tabriz, Damavand, Varamin, Karaj, Tehran, Hamadan, Yazd, Bushehr, Kerman, Mashhad, Shiraz, Ardebil and Shirvan. In addition, two European accessions were included in the study. In total twenty accessions were planted in the Research Farm of Isfahan University of Technology according to a randomized complete block design with three replications. Measured traits were days to 50 percent germination, days to 50 percent flowering, plant height, umbel width, the number of branches per plant and grain yield. Data analysis and mean comparisons showed that Kerman accession had the least seed yield (3.6 g per plant) and the umbel diameter (5.4 cm). It also had lower germination rate probably due to seed dormancy. In contrast, Hamadan accessions had the highest rate of germination. The maximum seed yield (39.4 g per plant) and umbel width (9.4 cm) were observed in Isfahan accession and a European accession (originated from Albania), respectively. The highest (130.4 cm) height belonged to a European accession while the lowest (74 cm) went to Karaj accession. The maximum and minimum numbers of branches per plant (12.3 and 7.9) were counted in Kashan and Tehran accessions, respectively. Regarding plant maturity, accessions from Europe were the most late maturing whereas Isfahan2 was the earliest one. Based on the results obtained, it seems that this fennel germplasm has considerable variation in morphological traits and also yield components necessary for plant breeding and improvement [1, 2].

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INVESTIGATION ON THE EXTRACTION METHODS OF OLEUROPEIN FROM OLIVE LEAVES EXTRACT

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Nowadays, the pharmacological and healthful properties of olive have been completely accepted; it is the result of many studies and researches that have been done for detecting and optimum separating of beneficial compounds of olive, over the years. Biophenols are a major group of these compounds. The beneficial biophenols that are effective on human health, especially Oleuropein, have significant content in olive leaves and they are extractable by different methods. This paper reviews several extraction methods and specially analyses the results obtained for Oleuropein; These methods include 1. Dynamic ultrasound-assisted extraction method (Time of extraction is 25min, HPLC–DAD separation–detection using of chromatograph–photodiode array detector assembly for individual separation–quantification). 2. Superheated liquid extraction method (Time of extraction is 13min, HPLC–DAD separation–detection using of chromatograph–photodiode array detector assembly for individual separation–quantification). 3. Microwave-assisted extraction method (Time of extraction is 8min, HPLC–DAD separation–detection using of chromatograph–photodiode array detector assembly for individual separation–quantification). 4. Supercritical fluid extraction method (Time of extraction is 140min, Photometric determination and Mass spectrometric screening). According to the analysis of results obtained, the Microwave-assisted extraction method is proposed as the best method for extracting of Oleuropein from olive leaves extract.

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DETERMINATION OF FATTY ACIDS IN SOME GRAPE CULTIVARS BY GAS CHROMATOGRAPHY MASS SPECTROMETRY

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In the present study, seeds of five grape varieties, grown in the West Azarbayjan (Iran), were examined for determination of fatty acids composition. Seeds from grape residues were dried for 24 h at 60 °C in the oven. An optimization study of influential variables on superheated hexane extraction (namely extraction time, temperature, pressure, particle size and sample amount) was carried out by a multivariate approach. All extracts were concentrated in oven and dried. To obtain fatty acid methyl esters (FAMES), 2ml of the dried extracts were subjected for reaction with 0.5 M solution of KOH in methanol and hexane. The fatty acid methyl esters (FAMES) were subjected to gas chromatography mass spectrometry (GC-MS) analysis in order to determine the types of fatty acids present. Grape varieties showed significant differences based on analysis of variance which applied a Duncan test with a 95% significance level ($p < 0.05$). The results revealed that grape seeds were rich in linoleic acids, palmitic acid and stearic acid ranging from 66.37 to 81.56%, 7.91 to 11.49% and 3.61 to 5.81%, respectively. The highest linoleic acid content was found in Shirazi grape, while Rezghi showed the highest palmitic acid content. Goye maleki showed higher stearic acid content than other cultivars studied. The linoleic and palmitic acids were the most useful parameters to discriminate the five grape varieties. The highest oleic acid content was found in Rashe sardasht which distinguished this variety from other cultivars. All varieties provided typical linoleic acid-rich oil compared to other vegetable oils. Grape seed oil was high in linoleic acid, almost equaled to safflower seed oil [1, 2]. The results indicated that grape seed oil could be considered as an important source for production of edible vegetable oil.

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National Congress on Medicinal Plants
16, 17 May 2012
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PRELIMINARY STUDY ON THE EFFECTS OF SOME MEDICAL (HERBAL) PLANTS EXTRACTS AND
COMPARISON WITH CYPERMETHRIN ON THE RHIPICEPHALUS (BOOPHILUS) ANNULATUS
(ACARIIXODIDAE)

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Ticks are blood-sucking ectoparasites of mammals and birds throughout the world, so they are potentially involved in transmission of variety pathogens including bacteria, protozoa and viruses among different animals. Throughout the world, tick control is based mainly on the repeated use of chemical acaricides. Indiscriminate use of these tick controlling chemicals has resulted in problems related to environmental pollution, leaving residue in meat and milk, and the resistance development in the target species. The interest in alternative methods for control of ticks has been dramatically increased in recent years, in accordance with increasing demands for safer animal products and environmental protection. In this experiment a preliminary study was conducted on the properties of some herbal plants extract (*Peganum harmala* L., *Artemisia absinthium*, *Artemisia annua*) and comparing them with Cypermethrin on the *Rhipicephalus* (*Boophilus*) *annulatus* in order to introduce a better extract against hard tick AcariIxodidae under laboratory condition. Collecting of *Rhipicephalus* (*Boophilus*) *annulatus* were done and transmitted to laboratory under suitable conditions. Ticks were immersed in ethanol 70% for preventing the secondary infection, then were kept in germinator with 80% relative humidity and 28°C. Herbal extracts were prepared, and ticks were immersed into herbal extracts for about one minute. Then they were transmitted in to separate Petri dishes and incubated for five days in 26 °C and 80% relative humidity and mortality rate was recorded daily. Total mortality rate of 100% was observed for *Peganumharmala* L., whereas mortality in the comparative group whom immersed in Cypermethrin was 20%. It was showed that *Peganumharmala* L. was 2.22 times more potent than Cypermethrin. *Artemisia absinthium* with approximately 6% was in the second place. It was found that *Artemisia annua* had no considerable effect on tick's mortality rate, in comparison with Cypermethrin. In conclusion use of *Peganum harmala* L was more efficient than Cypermethrin. Despite the efficacy of some of this herbal extracts to control ticks, evaluation of their effects at field condition are needed before they can be used in designing of practical tick management program.

EFFECT OF ESSENTIAL OILS ON POSTHARVEST QUALITY OF
CUT ALSTROEMERIA FLOWER

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Essential oils are known to possess antimicrobial properties, which extended vase life of cut flowers. We investigated the effects of essential oils on postharvest quality of *Alstroemeria* cut flowers. Cut stems pulsed for 24 h with Carvacrol, Thymol and Thyme oil (50 and 100 mg L⁻¹). Results showed that the maximum vase life was recorded in Carvacrol 50 and 100 mg L⁻¹+ 3% sucrose (15 day). Vase life of cut stems were 7 days more in this treatment than water control. In addition, pulsing with Carvacrol (50 mg L⁻¹) increased water uptake and fresh weight. Data showed that essential oils decreased protein degradation and lipid peroxidation in petals. Moreover, results indicate that essential oils treatments delayed leaf yellowing and maintenance chlorophyll content in leafy stem. Therefore, applying essential oils in vase solution are useful for increasing longevity of cut *Alstroemeria* cv. Sukari [1, 2].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



GC/MS ANALYSIS OF *ZIZIPHORA PERSICA* BUNGE ESSENTIAL OIL AND ITS COMBINED ANTIFUNGAL ACTIVITY WITH ITRACONAZOLE AGAINST *RHODOTORULA MUCILAGINOSA*

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Essential oils are aromatic substances obtained from aromatic edible and medicinal plants. The oils have been shown to exhibit different biological (antimicrobial, antioxidant and so forth) activities [1]. Several oils have been used in pharmaceuticals, whereas some of oils have been applied in food preservation. *R. mucilaginosa* can cause infections, especially in immunocompromised patients. Also, the yeast is considered as a food spoiling microorganism. This study was carried out to determine the chemical composition and antimicrobial activity (used singly and in combination with itraconazole) against *R. mucilaginosa*. The hydrodistilled essential oil of aerial parts of *Z. persica* Bunge was analyzed by GC/MS. The anti-yeast activity of the essential oil and itraconazole was determined using a broth microdilution assay. Also, the combined antimicrobial effect was carried out according to EUCAST protocol to calculate the fractional inhibitory concentration index (FICI) [3]. Forty three constituents were identified, representing 97.36% of total oil composition. The most abundant group of components was monoterpene hydrocarbons. The major constituents were (+)-Pulegone (53.66%), β -Pinene (7.35%), Limonene (4.12), β -Myrcene (3.75%) and Piperitenone (2.21%). Minimum inhibitory concentrations (MICs) of the essential oil and Itraconazole against *R. mucilaginosa* were 1700 μ g/ml and 4 μ g/ml, respectively. The MICs above 1600 μ g/ml indicated a weak antimicrobial activity [4]. Therefore, the essential oil exhibited a weak antimicrobial activity. The interactive antifungal effect showed that the MIC of each antimicrobial (in combination) was decreased, remarkably. Consequently, the FICs of the essential oil and Itraconazole were equal 0.25 and 0.125, respectively. Therefore, the FICI was 0.375. This FIC indicated a synergism phenomenon between two agents (essential oil + Itraconazole). In conclusion, we suggest the combination of *Z. persica* Bunge essential oil and Itraconazole, for control of *R. mucilaginosa*, can reduce the effective dose of Itraconazole. In addition, this combination results in reduction of microbial resistance. The appropriate synergism interaction could be a challenge for in vivo studies.

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COMPARISON OF ESSENTIAL OIL YIELD AND COMPOSITION OF THREE POPULATIONS OF PURPLE BASIL (*OCIMUM BASILICUM* VAR.PURPLE)

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To investigate the effect of drought stress on some morphological traits and yield of three populations of Purple Basil (*Ocimum basilicum* var.purple), an experiment was performed in the Alborz Karaj research station, in 2011, as a split plot randomized complete block design with three replications. Main factors include population from Karaj, Isfahan and Shushtar, sub-factor were different levels of drought stress include 90%, 60%, 30% field capacity, which those applied during the period of plant growth (from the seedling to the seed loss). Analysis of variance showed that among different populations in terms of yield and oil content of leaves, Inflorescence, flowering shoot and flowering shoot in the first harvest there was no significant difference in the second harvest. Analysis of variance at different levels of drought stress on yield and oil content in the organs was significant at 1% level. Analysis of variance showed that the compounds contain no significant differences between different populations and drought stress treatments were significant at 1% level. Comparison of secondary factor showed that the highest percentage of the leaf essential oil (0/86%), Inflorescence (0/74%), flowering shoot (0/76%) in the first harvest and flowering shoot (0/82%) in the second there was a level of 30% Fc. Lowest percentage of leaf essential oil (0/36%), Inflorescence (0/20%), flowering shoot (0/15%) in the first harvest and flowering shoot (0/24%) in the second harvest was observed in 90% Fc. Comparison showed that the maximum yield of leaf essential oil yield (11/76 kg/ha), Inflorescence (12/52 kg/ha), flowering shoot in the first harvest (7/84 kg/ha) and flowering shoot in the first harvest (17/56 kg/ha) was observed in 30% Fc. Minimum yield of leaves (8/29 kg/ha), Inflorescence (6/16 kg/ha), flowering shoot (5/10 kg/ha) in the first harvest and flowering shoot (10/49 kg/ha) in the first harvest in there was a level of 90% Fc. Comparison of essential oil compounds showed the highest percentage of methyl Chavicol (58/39%), Linalool (31/83%), (cis)- α -Bergamotene (2/20%), Camphor (1/27%), Germacrene D (1/03%) and epi- α -Cadinol (3/74%) was observed in 30% Fc. Lowest percentage of methyl Chavicol (50/46%), linalool (19/92%), (cis)- α -Bergamotene (0/88%), Camphor (0/65%), Germacrene D (0/67%) in 90% and epi- α -Cadinol (2/19%) was present in 60% Fc. In this research, the highest percentage of essential oils in the leaves and maximum yield of essential oils was in karaj population * 30% fc. This experiment revealed two important compound methyl Chavicol and linalool, respectively, in Isfahan* 30% fc, Karaj * 30%fc and the highest crops were equipotent.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



PROTECTIVE EFFECT OF *EMBELICA OFFICINALIS*, *TERMINALIA BELERICA* AND *TERMINALIA CHEBULA* EXTRACT ON SERUM/GLUCOSE DEPRIVATION-INDUCED PC12 CELLS DEATH

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The serum/glucose deprivation-induced cell death in cultured PC12 cells represents a useful *in vitro* model for the study of brain ischemia and neurodegenerative disorders. *Embelica officinalis*, *Terminalia belerica* and *Terminalia chebula* have been known as a source of antioxidants. To elucidate the neuroprotective effects of these plants *in vitro*, we studied their effect on cell viability and reactive oxygen species (ROS) production in cultured PC12 cells under serum/glucose deprivation conditions. PC12 cells were cultured in DMEM medium containing 10% (v/v) fetal bovine serum, 100 units/ml penicillin, and 100 µg/ml streptomycin. Cells were seeded overnight and then deprived of serum/glucose for 6 and 18 h. Cells were pretreated with different concentrations of Plant extract. Cell viability was quantified by MTT assay. ROS was measured using DCF-DA by flow cytometry analysis. Depriving the PC-12 cells of serum/glucose caused prominent cell toxicity at least after 6 h. Pretreatment of PC12 cells with plant extract could reduce serum/glucose deprivation-induced cytotoxicity in PC12 cells after 18 h. Serum/glucose deprivation toxicity was consistent with increased ROS production which reduced by extract pretreatment. The experimental results suggest that *Embelica officinalis*, *Terminalia belerica* and *Terminalia chebula* extracts protect the PC12 cells against serum/glucose deprivation-induced cytotoxicity. Our findings might raise a possibility of potential therapeutic application of these extract for preventing and treating cerebral ischemic and neurodegenerative diseases.

MASS CLONE OF ALOE (*ALOE VERA* L.) ON *IN VITRO* SYSTEM FROM SHOOT TIP EXPLANT

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In this study we have examined the potential of *in vitro* micropropagation of Aloe (*Aloe vera* L.) by using shoot tip explants on MS medium containing 20g l⁻¹ sucrose and 7 g l⁻¹ agar. The effect of different hormonal treatments on plant proliferation have been studied. Hormonal treatment had a significant effect on percentage of explants that show positive response to plant regeneration and on number of plantlet that regenerated on *in vitro* condition. The highest proliferation was 8.23-8.66 plantlet from each explants, obtained from 1 mg l⁻¹ BA combination with 0.25 or 0.5 mg l⁻¹ IBA and 8.63 plantlet from medium containing 0.5 mg l⁻¹ of BA+0.25 mg l⁻¹ of NAA. Least proliferation observed on free hormone MS medium (2.3 plantlet on each explant). Except of free hormone MS medium that only 8.33% of explants response to *in vitro* condition in other mediums satisfactory response observed. 100% of root formation on regenerated plantlets was down on free hormone of MS medium.

THE EFFECT OF DIFFERENT LEVELS OF GARLIC POWDER ON SPERM CHARACTERISTICS IN DALAGH RAMS

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The purpose of this study was to investigating the effect of feeding dietary Garlic powder on sperm characteristic in ram. 8 dalagh ram Were fed by diets containing 0,5,10,15 gr garlic powder for nine weeks and were semen collected for 4 consecutive weeks to investigate seamen appearance assessment, sperm progressive motility, viability percent. Experiment was statistically analyzed using change over design with 4 factor and 2 replicated in each treatment. The result showed that there were no significant difference between treatments and control groups but there were significant difference between interactional effect of time and treatments in case of sperm progressive motility.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ESSENTIAL OIL ANALYSIS AND PHYTOTOXIC ACTIVITY OF *FERULA ASSA-FEOTIDA* L. GROWING IN FARS PROVINCE

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This investigation was conducted in Rizab Agricultural Center located in the suburbs of Neyriz, Fars, Iran to determine the essential oil composition and allelopathic properties of Anghuzeh (*Ferula assa-feotida*) medicinal plant. The experiment was completely randomized design in a factorial arrangement with two factors and three replications. The factors were six concentrations of 0, 200, 400, 600, 800, and 1000 ppm of the essential oil and five plant species including three weed species, *Sinapis arvensis*, *Acroptilon repens*, and *Cardaria draba* as well as two crops i.e. *Triticum aestivum* and *Hordeum vulgare*. The essential oil which used in this study was extracted by hydro-distillation from the latex of the plant. The obtained oil was analyzed by Gas chromatography (GC) and Gas chromatography–mass spectrometry (GC-MS). To assess the allelopathic effects of the oil on the studied species, a number of growth parameters such as seed germination, radical and plumule length as well as their dry and fresh weight, and abnormality percent of the seedlings were evaluated. The results of this investigation showed that the Anghuzeh essential oil has significant ($p \leq 0.05$) allelopathic effect on the studied weeds and crops. The comparisons among the means indicated that the response of the species to the oil were quite different. For example, *Triticum aestivum* showed maximum germination percent in the present of different oil concentrations. While, the germination of *Hordeum vulgare*, *Acroptilon repens*, and *Cardaria draba* showed more susceptibility to the oil. Moreover, the results of the essential oil analysis indicated that a total of 13 components are presented in the oil which α -Pinene (21/3%), β -Pinene, (47/1%) and 1,2-Dithiolane (18/6%) were the major compounds. The observed allelopathic effects of the essential oil in this study are regarded to oil components and their synergistic effects. The findings of this study are the first step to use of Anghuzeh essential oil as a natural herbicide. Further investigations are still required for practical and commercial application of this method.

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COMPARISON ANALYSIS OF BIOCHEMICAL COMPOUND IN *GLYCYRRHIZAGLABR* ROOTS FROM TWO LOCALITIES OF IRAN (BOJNOURD) AND AFGHANISTAN (HARATE)

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Liquorice (*Glycyrrhizaglabra* Family *Leguminosae*) is a very popular medicinal plant in the world. It, also known as licorice and sweetwood, is native to the Mediterranean and certain areas of Asia. Licorice rhizomes are used in herbal medicines for health effects and it contains more than 100 various useful compounds including phenolics and triterpenesaponins (glycyrrizin). In this study, the content of some biochemical compounds (sugar, phenol and protein) important in pharmacy, food industry and economics were compared in *G. glabra* roots gathering from two localities of Iran (Bojnourd) and Afghanistan (Herat). Data showed that higher content of sugar (39.74 mg/gDW) was in Herat against Boujnourd (23.61). Bojnourd locality showed higher content of total phenolic compounds (167mg/gDW) than Herat (73.43). Protein content was higher in roots gathered from Herat (20.32mg/gDW) than Bojnourd, but this different was not significant. It seems that there is a correlated between the content of secondary metabolite production and climate condition. Therefore, environmental conditions are important factors in production of secondary metabolites in liquorice plants [1-5].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



COMPARISON ANALYSIS OF BIOCHEMICAL COMPOUND IN GLYCYRRHIZAGLABRAROOTSFROM TWO LOCALITIES OF IRAN (BOJNOURD) AND AFGHANISTAN (HARATE)

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Liquorice (*Glycyrrhizaglabra* Family *Leguminosae*) is a very popular medicinal plant in the world. It, also known as licorice and sweetwood, is native to the Mediterranean and certain areas of Asia. Licorice rhizomes are used in herbal medicines for health effects and it contains more than 100 various useful compounds including phenolics and triterpenesaponins (glycyrrizin). In this study, the content of some biochemical compounds (sugar, phenol and protein) important in pharmacy, food industry and economics were compared in *G. glabraroots* gathering from two localities of Iran (Bojnourd) and Afghanistan (Herat). Data showed that higher content of sugar (39.74 mg/gDW) was in Herat against Boujnourd (23.61). Bojnourd locality showed higher content of total phenolic compounds (167mg/gDW) than Herat (73.43). Protein content was higher in roots gathered from Herat (20.32mg/gDW) than Bojnourd, but this difference was not significant. It seems that there is a correlation between the content of secondary metabolite production and climate condition. Therefore, environmental conditions are important factors in production of secondary metabolites in liquorice plants.

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IMMUNOMODULATORY EFFECTS OF *ALOE VERA* ON THE RESPONSE OF MACROPHAGES IN THE PRESENCE OF THE FUNGUS *CANDIDA ALBICANS* IN MICE

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Natural products are important resources in herbal medicines and have been long used for prevention and treatment of many diseases. Medicinal plants have immunomodulator properties. *Aloe vera* is one of these plants with medicinal properties. *Aloe vera* has been shown to modulate the immune response. Candidiasis is one of the most common fungal infections and *Candida albicans* has become the fourth most common cause of hospital infections. Macrophages have been shown to play an essential role as the first line of defense against invading pathogens. So in this article the effects of *Aloe vera* plant extracts on macrophage activation have been evaluated [1,2,3]. At first we infected the 5 groups of mice with *Candida Albicans* and then allowed the *Candida* to activate in one week. Then the *Aloe Vera* extract was injected to mice. Then intraperitoneal macrophages of mice were obtained and in the end MTT test was performed in order to evaluate the viability of intraperitoneal macrophages. In vivo results show that all of the doses of the *Aloe Vera* extract (100 mg/kg, 50, 20, 10) significantly increased cell viability in the presence of mitogen but all of the doses of the *Aloe Vera* extract does not have an influence on the viability of macrophages in the absence of mitogen. This study showed that *Aloe Vera* extracts in vivo in the presence of an immune stimulator have an effective role in stimulating the immune system. In further studies, such as isolation and purification of *Aloe vera* components, are necessary to clarify the modulatory effects of *Aloe vera* on macrophage function.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ANTIMICROBIAL EFFECTS OF THE EXTRACTS OF *ALLIUM SATIVUM* (GARLIC) AND *MENTHA PIPERITA* (MINT) ON THE GROWTH AND MULTIPLICATION OF *LISTERIA MONOCYTOGENSE* USING PCR

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The current study was conducted to investigate the possible antimicrobial roles of *Allium sativum* (garlic) and *Mentha piperita* (mint) against *L. monocytogenes*, in vitro. The bacteria were initially confirmed using selective procedure on Palcam agar after being enriched in BLEB (Buffered Listeria Enrichment Broth). The extract was then pured using Rotatory evaporator equipment before being leophylyzed. The anti-listerial effects were subsequently investigated by plate diffusion agar and different dilutions of the extracts. The technique was also optimized using standard antibiotic discs. Our results showed the bactericidal effects of 250 mg ml⁻¹ *Allium sativum* and 800 mg ml⁻¹ on the microorganism. Simultaneously, the Amoxycillin, tetracycline, tylosine, sulfadimidin + trimethoprim discs were also used to compare with the anti-listerial effects of the extracts. When we set a PCR using specific set of primers, which was based on dilution of the enrichment broth followed by lysis of the bacteria and direct analysis of the lysate with PCR, the same results was also shown. Considering the importance of antibiotic resistance against synthetic medicines, we may suggest, here, that using such herbal components can mimic the anti-bacterial effects and thus, the risks of the resistance would be diminished.

ANTIMICROBIAL EFFECTS OF THE EXTRACTS OF *CONTAUREA DEPRESSA* ON THE GROWTH AND MULTIPLICATION OF *CAMPYLOBACTER JEJUNI* IN BROILER CHICKENS USING PCR

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Campylobacteriosis considered as one of the most prevalent cause of bacterial enteritis, worldwide. *Campylobacter jejuni* is the most common *spp.* cause of the disease in humans. Reducing the rate of infection in broiler chicken is believed to diminish the infection in man. Results presented here showed the effects of the herbal extract on excluding the microorganism in chicken carcasses at the concentration of 5 mg/ml which were demonstrated both in minimum inhibitory concentration (MIC) and PCR assays. Considering the importance of the transmissible anti-bacterial resistance among different bacterial strains, we may suggest here that the pure extract of *Cantaurea Depressa* could possibly function as an anti-campylobacter substances. A total of 100 swabs were collected from the carcasses (using raising method) in order to enrich the specimens (in microaerophilic condition at 42 °C for 48 h), cultured in campylobacter selective agar (thioglycolate agar plus sheep blood) and submitted for DNA extraction to perform mPCR using the specific primers designed for *C. jejuni*. The bacteriocidal/static effects of the extract was the compared to the standard concentrations amoxycillim, tetracycline, tylosine, sulfadimidin, trimethoprim discs. A PCR assay using specific set of primers was also established to detect species-specific amplicon corresponding to the microorganism. MIC and MBC were 1.4 mg/ml and 1.65 mg/ml of *Cantaurea Depressa* correspondingly. Furthermore, the PCR was able to demonstrate the same results with the amplification of 480 bp correspond to *C. jejuni*. Considering the importance of the antibiotic resistance against the synthetic drugs, we may suggest here that using such components may mimic the anti bacterial effects and thus play a substantial role in the public health issues.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



HERBAL EXTRACT OF *BERBERIS VULGARIS*: IS THERE ANY ANTI-BACTERIAL EFFECTS ON *CAMPYLOBACTER JEJUNI* IN BRILER CHICKENS?

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Campylobacter species are found in the intestinal tracts of domestic animals, usually without any detrimental effects. However, they can cause severe disease in infected people and are recognized as one of the major causes of food-borne gastroenteritis in humans, worldwide. The present study was constructed to show the effects of the herbal extract on excluding the microorganism in chicken carcasses at the concentration of 5 mg/ml which were demonstrated both in minimum inhibitory concentration (MIC) and PCR assays. Considering the importance of the transmissible anti-bacterial resistance among different bacterial strains, our findings may suggest that the pure extract of *Cantareua depressa* could possibly function as anti-campylobacter substances. A total of 100 swabs were collected from the carcasses (using raising method) in order to enrich the specimens (in microaerophilic condition at 42 °C for 48 h), cultured in campylobacter selective agar (thioglycolate agar plus sheep blood) and submitted for DNA extraction to perform mPCR using the specific primers designed for *C. jejuni*. The bacteriocidal/static effects of the extract was compared to the standard concentrations amoxicillim , tetracycline , tylosine , sulfadimidin , trimethoprim discs. A PCR assay using specific set of primers was also established to detect species-specific amplicon corresponding to the microorganism. MIC and MBC were 0.75 mg/ml and 0.9 mg/ml of *Berberis Vulgaris* correspondingly. Furthermore, the PCR was able to demonstrate the same results with the amplification of 480 bp correspond to *C. jejuni*. Considering the importance of the antibiotic resistance against the synthetic drugs, we may suggest here that using such components may mimic the anti bacterial effects and thus play a substantial role in the public health issues.

THE STUDY OF DRYNESS TENSION ON PHYSIOLOGICAL AND BIOCHEMICAL FEATURES OF *FOENICULUM VULGARE*

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Among the deterrent factors to environmental growth and pharmaceutical and aromatic plants function, dryness is the most important factor in decreasing production especially in dry and semi-dry regions. *Foeniculum vulgare*) is a plant of umbelliferae family that has many applications in different industries such as; pharmaceutical, nutritional, hygienic and cosmetic. In order to investigate the effect of dryness tension on the essence of fennel, on growth and increase in adaptable metabolism, prolene, soluble and insoluble sugar, protein, chlorophyll a, b, and total, an experiment was conducted under the controlled conditions in a greenhouse by vase method with fire cares, measuring of protein by method of folin-lowry, sugar by fennel-sulfuric method, prolene by bate method and photosynthetic dyestuffs by Arnon method was performed. The essence was done by method of distillation with water. The essence was studied qualitatively and quantitatively by GC/MS device. The results of statistical analysis demonstrated that dryness tension had a meaningful effect on the growth parameters. By increasing of the dryness tension of height of aerial organs, wet and dry weight of aerial organ decreased. The amount of prolene and sugar had a significant increase. Protein showed a decreasing trend. Chlorophyll a did not show a specific behavior but chlorophyll b showed a decreasing trend. . Essence changes is grown in proportion to shahed quantitatively. The most and the least amount of essence is related to treatment of number 5 and Shahed, respectively that shows by increasing of tension, the little amount of water essence is increased. The main composition essence of this plant is anetole. The most amount of anetole is in the essence of fourth care with 0.3704 percent. Another main composition is limonene that the most amount of it with 0.3799 percent is in fifth treatment. Another important compositions essence of this plant are phenchyl acetate and esteragol.

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CHEMICAL VARIATION OF ESSENTIAL OIL OF *SATUREJA RECHINGERI* JAMZAD FROM DIFFERENT HABITATE IN ILAM PROVINCE

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Satureja rechingeri is one of the worth *Satureja* species in Iran, that growth as an endemic plant in Ilam province (Jamzad 1996). This species in vegetative form and percentage of main chemical component is near to *S. Khuzestanica*. In order to study the qualitative and quantitative of essential oil of this plant to find the best chemotype of its different population. The aerial parts were collected in full flower in stage from seven different habitations in Ilam province. The specimen were dried in laboratory, the essential oils were isolated by hydro distillation and analyzed by capillary GC and GC-MS. The oils yield of collected specimen and percentage of their main component (Carvacrol) respectively were Station 1 (2.9%, 94.4%), Station 2 (3.2%, 95.6%), Station 3 (3.6% , 95.1%), Station 4 (3.0%, 94.6%), Station 5 (2.1%, 95.5%), Station 6 (3.7%, 95. %2) and Station 7 (2.2%, 92.5%). The highest oil yield was obtained of Station 6, 3.7% and the least oil was belong to Station 7, 2.2%. The highest percent of Carvacrol was belong to Station 2, 95.6% and the least percent obtained of Station 7, specimen 92.5%. To compare with other *Satureja* species essential oil yield and the rate of it's main component carvacrol, *S. specigeri* (3.8%, 4.0%), *S. sahandica* (1.5%-2.9%, 0.7%-1.3%), *S. intermedia* (1.5%, 0.8%), *S. macrantha* (1.4%, 4.0%), *S. mutica* (2.3%, 30.9%), *S. khuzestanica* (3.0%, 29.6%), *S. bachtiarica* (1.6%-3.0%, 29.7%-66.5%) and *S. hortensis* (1.7%, 41.2%), (sefikon ea al, 1383), showed that *S. rechingeri* is one of the worth *satureja* species in world that can be introduced as a rich Carvacrol source.

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VARIOUS ANTIOXIDANT PROPERTIES OF *DRACOCEPHALUM KOTSCHY* FLAVER EXTRACT

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Antioxidants are compounds that protect the body against damage caused by oxidative stress that induce by free radicals. The present work was compared the various antioxidative activities of dracocephalum kotschy methanol flaver extract (DKME) and dracocephalum kotschy flaver ethanol extract (DKE E). This experimental study, which carried out in 1390 in Lorestan Medical respectively. Radical scavenging activity of samples was assessed by using Diphenylpicrylhydrazyl (DPPH), Total antioxidant capacity samples was assessed by methods phosphomolybdat.Sciences University. Methanol and ethanol extracts were prepared and then the amount of total phenol and flavonoid samples was assessed by methods Folin-Ciocalteu and Zhishen .It was demonstrated that total antioxidant capacity, phenol content and flavonoid content of DKE E were better than DKME. In the DPPH scavenging assay, the IC₅₀ (the concentration required to scavenge 50% of radical) values of DKEE and DKME and BHT as refernce were 25.17± 0.23 and 32.82 ± 0.11 and 0.82 ± 0.11µg/ml, µg/ml, respectively.This study showed that dracocephalum kotschy flaver extract is an source easily accessible of natural antioxidants and it may be suitable for use in food and pharmaceutical applications.

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EFFECTS OF SOME IMMUNOSTIMULANTS ON GROWTH RATE AND RESISTANCE AGAINST ENVIRONMENTAL STRESSORS IN *BARBUS BARBULUS*

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In this study the growth stimulatory effects and resistance against environmental stressors (density, transport and bacterial infection) of oral administration of Levamisol, Ergosan and Vitamin C as well as extract of *Echinacea*, *Aloe vera*, *viscum albom* and *Nigella sativa*, in *barbus barbulus* were investigated. A total of 1200 fish (weighing 1.9 ± 0.12) were randomly divided into 8 groups in triplicates for each immunostimulant plus to control group. The fish feed mixed with immunostimulants and each treatment was fed with their specific feed for 6 weeks. Mortality rate during the study, initial and final weight and food consumption were recorded in each group. At the end of the study the density and transport stress tests were carried on and all treatments challenged with *Aeromonas hydrophila*. Results showed that growth factors including Specific growth rate, growth percentage and growth conversion rate significantly improved in all treatments except *Nigella sativa* compare to control ($P < 0.05$). Post challenge mortality and density stress mortality significantly decreased in all treatments except Vitamin C and *Nigella sativa* groups compare to control ($P < 0.05$). No significant changes were seen in mortality rate during treatment period and results of transport stress test ($P > 0.05$). It can be concluded that the extracts of *Echinacea purpurea* and *Viscum albom* have stimulatory effects on growth and resistance against bacterial infection and density stress in *Barbus barbulus* and it is comparable with the effects of approved fish immunostimulants such as Ergosan, Levamisol and Vitamin C [1-3].

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SIMULTANEOUS DETERMINATION OF TOTAL CATECHIN CONTENT (TTC) IN GREEN TEA USING ULTRASOUND-ASSISTED EXTRACTION FOLLOWED BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

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Green tea is consumed in Japan and China as one of the most popular and traditional non-alcoholic beverage. Also, green tea is receiving considerable attention for specific health claims and because of the presence of functional constituents, such as caffeine, ascorbate and catechins [1]. The catechins are composed of a family of four major substances, epicatechin (EC), epicatechin gallate (ECG), epigallocatechin (EGC), epigallocatechin gallate (EGCG) and four minor catechins, catechin (C), catechin gallate (CG), gallocatechin (GC) and gallocatechin gallate (GCG) as epimers of the major catechins [2]. In this work, ultrasound-assisted extraction (UAE) was developed and studied for the simultaneous determination of total catechin content (TCC) of green tea prior to the quantification by high performance liquid chromatography-diode array detector (HPLC-DAD). In this study we present a systematic investigation of affecting parameters for preconcentration of TCC by designed experiments according to the methodology of box-behnken design (BBD). Effect of six experimental factors: temperature, time, percent of solvent, proportion of solvent to herb and the power of ultrasound system on the extraction of target analytes were studied and optimized by using the analysis of variance (ANOVA). The obtained results were analyzed by Minitap software and the optimum conditions for TCC extraction were concluded as follow: time: 44min, temperature: 83.25°C, mesh size: 15, power of ultrasound bath: 85%, percentage of ethanol: 74.5%, the proportion of solvent to green tea: 23.

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MICROPROPAGATION OF *MORINGA PEREGRINA* USING SEED-BORN SHOOTS

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Moringa peregrina (Forssk). Fiori which is named as miracle tree is one of the valuable medicinal plant species growing in South-East part of Iran. The species is characterized with a number of medicinal as well as nutritional, industrial, and sanitary properties [1]. It may be used as a safe source of edible oil along with all its medicinal potentials. Although, due to over exploitation, its growing habitats have been limited, artificial plantation would provide local residents requirements, as well as preparing extra employments. Micropropagation of seed-born shoots was used in this research, in order to satisfy prerequisites of preservation of the remained stands of the species. Immature seeds were collected from three habitats of the species, called Chanf, Benet, and Kenshki, located in Sistan and Baluchestan province. Immature seeds were sterilized and inoculated onto basic media of WPM and MS [2] containing 7 different hormone compositions. Determining the best media for immature seed germination, shoot segments were transferred onto shoot proliferation medium. MS and 1/2MS basic media, BAP, Kinetin and 2ip cytokinins in various concentrations, in combination with NAA and IBA auxins, and various amino acids were used in shoot proliferation media. The effects of IAA, IBA and NAA auxins along with phenilalanin amino acid were examined on *in vitro* rooting of the micro-shoots. Results indicated WPM as the best culturing media for immature seed germination, whereas, less matured seed showed better growth on the media with higher calcium contents. Several shoot proliferation experiments revealed that the seed samples collected from Chanf location showed the best response to the various tested media. Also it was revealed that for micropropagation of the species by seed-born shoots, shoot proliferation should be done first on MS medium containing 0.5 to 1 mg/l BAP, then the multiplicated shoots must be transferred to a medium with less concentration of BAP (e.g. 0.1 mg/l). The shoots then must be transferred to 0.1 mg/l NAA. One of the main problems of micropropagation of the *Moringa* species is irregular forms and color of the shoots. These irregularities would not cause any difficulties in micropropagation, neither on Chanf nor on other studied samples.

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EFFECT OF BLACK SEED (*NIGELLA SATIVA*) ON PERFORMANCE, BLOOD PARAMETERS AND HUMERAL IMMUNITY IN BROILER CHICKENS

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This experiment was conducted to investigate the effect of black seed (*Nigella sativa*) on performance, blood parameters and humeral immunity in broiler chickens. In a completely randomized design, 250 day-old broiler chicks were used and allotted equally into twenty five groups with five replicates of 10 chicks each. The nutrient requirements were adjusted according to the Ross-308 Company manual. Dietary treatments were a control basal diet (without black seed), basal diet + 0.5% black seed, basal diet + 1% black seed, basal diet + 1.5% black seed, the basal diet + 2% black seed. Feed intake, weight gain, feed conversion and mortality were measured weekly during the experiment. Blood samples were taken on days 21 and 42 to measure the amounts of albumin, total protein, triglyceride, cholesterol, HDL, LDL, bilirubin, enzymes (ALT and ALP), glucose and uric acid. To evaluate the efficiency of the immune system after injection of 0.5% SRBC at days 7 and 14, blood samples were taken on days 21 and 28. The results showed that the feed conversion ratio between 0 to 21 days, weight gain in the first five weeks and feed consumption of 8 to 21 days were significantly influenced by the black seed. The effect of black seed on bilirubin, cholesterol and triglycerides were significant. The HDL and bilirubin levels were significantly influenced by the addition of black seed to diet. Live weight and carcass weight were significantly affected by the black seed in the starter period. Total immunoglobulin, IgM and IgG on 21 and 28 days were increased by the use of black seed, but the change, were not statistically significant. It is concluded that black seed may impact performance and blood parameters.

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EFFECTS OF BLACK SEED (*NIGELLA SATIVA*) ON MORPHOLOGY OF JEJUNAL VILLOUS OF SMALL INTESTINE AND PERFORMANCE IN BROILER

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This experiment was conducted to investigate the effect of black seed (*Nigella sativa*) on intestinal morphology and performance of broiler chicks in a completely randomized experiment. Two hundred fifty day-old broiler chicks were used and allotted equally into twenty five groups of five replicates of 10 birds each. The dietary treatments were: a control basal diet (without adding black seed), basal diet + 0.5% black seed, basal diet + 1% black seed, basal diet + 1.5% black seed and the basal diet + 2% black seed. On day 21th, one bird from each pen was randomly selected and sacrificed to excise the intestinal tract. The tissue samples were taken from jejunum. Tissue sections were harvested from 0.5 mm pieces with 5 μ m thickness by microtome and were fixed on slides [1]. The slides were examined on an Olympus AX40 microscope fitted with a digital video camera. The measurements were included: villous length (VL), crypt depth (CD), villous ratio (VL/CD), villous width (VW), villous surface (VS) area, number of papilla (NP) and villous surface area (VSA) [2]. The weight gain (WG) and feed conversion ratio (FCR) were calculated using feed consumption divided by body mass gain. Supplementation of 2% black seed in diet showed an increase in VL, NP, VSA and WG ($P < 0.05$) but VW and FCR were decreased significantly compared to the control group. A decrease in feed conversion ratio with an improvement in growth were observed when chicks were fed diet contained 2% black seed. The present study indicated that dietary black seed (*Nigella sativa*) may exert beneficial effects on gastrointestinal tract through histological changes in intestinal villous and thus enhancing the absorption of nutrients.

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PALYNOLOGICAL STUDY OF TEN MEDICINAL SPECIES OF ANTHEMIDEAE TRIBE (ASTERACEAE) IN IRAN

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The largest family of flowering plants is Asteraceae comprising 1600-1700 genera and ca. 2400 species distributed around the global except for Antractica. The Anthemideae is a medium sized tribe in the family comprising 111 genera with ca. 1800 species. This tribe contains 13 genera in Iran. Members of Anthemideae are used and cultivated for a broad variety of purposes, mainly as medicinal and ornamentals importance. The pollen grains of 10 medicinal species belonging to the tribe Anthemideae-Asteraceae from Iran were studied by light and scanning electron microscopy. For palynological studies following parameters in 20 pollens of each species were measured: polar axis (P), equatorial diameter (E), P/E ratio. The majority of pollen grains were oblate- spheroidal (58%) followed by suboblate (12%), spheroidal (12%) and 9% prolate-spheroidal. Oblate- spheroidal and spheroidal shapes were common for all of the genera studied. Regarding sculpturing pattern of exine surface two types of pollen were recognized: Anthemis type or echinate, which is characterized by long spines as exine ornamental element and Artemisia-type with spinules microechinate. The "Artemisia-type" pollen grain occurs in *Artemisia* whereas the "Anthemis-type" is found in rest of genera. Polar axis and equatorial diameter length was found to be the highest in *Matricaria recutita* (22.8 and 23.64 μ m) and lowest in *Anacyclus nigellifolius* (32.5 and 33.2 μ m).

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ADJUSTMENT EFFECTS OF DROUGHT STRESS ON THE HERBAL CUMIN SEED (*CUMINUM CYMINUM*) WITH SALICYLIC ACID

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Drought stress is one of the most important factors that limit crop production [1]. Exogenous application of salicylic acid (SA) has been found very effective in reducing the adverse effects of drought stress. Salicylic acid is a conservative compound of some biological stresses and it is important molecular signal for adjustment plants reaction to environmental stresses [2]. This study was conducted to examine the possible role of exogenous salicylic acid on germination and seedling stage of Cumin (*Cuminum cyminum*) as medicinal plant under drought stress. Thus for this purpose, an experiment design in case of factorial (AB) base completely randomized design (CRD) with three replications at Seed technology laboratory in Shahed University were conducted. Combination of Salicylic Acid hormone levels (0, 0.3 and 0.6 mM) and drought stress levels (0, 0.4, 0.8, 1.2 and 1.6 Mpa) on germination and seedling growth as factors were applied. The results showed that the effect of drought stress, salicylic acid and its interaction on germination and seedling growth including (germination percentage, mean germination time, germination rate, shoot length, root length, shoot weight, root weight) was significant ($P < 0.01$). In which, with applying drought stress up to 1.6 Mpa, most parameters of germination and plant growth decreased so in drought conditions, the highest and lowest of germination percentage were obtain in control (88.33%) and at 1.3, (12.44%), respectively. Overall, results showed that the priming treatments of salicylic acid (0.3 mM) on seeds of herbal cumin can increase the shoot length, root length to drought in germination and plant seedling stage. However, salicylic acid was no significant effect on seed germination percentage cumin.

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ANTIMICROBIAL ACTIVITY OF CYANOBACTERIA (BLUE – GREEN ALGAE) ISOLATED FROM HOT SPRING GENO

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Cyanobacteria (blue-green algae) are rich sources of structurally novel and biologically active metabolites. Recent studies indicate the presence of some bioactive compounds in the blue green algae which are shown to exhibit anticancer, antimicrobial, antifungal or anti-inflammatory and other pharmacological activities. The present study was aimed to collect and identify the cyanobacteria from hot spring, Geno, Bandar Abbas. Totally 21 species cyanobacteria were collected and cultured in BG-11 medium. Based on their growth characteristics, seven species namely *Oscillatoria subbrevis*, *O. tenuis*, *O. limnetica*, *O. angusta*, *O. articulate*, *Synechocystis aquatilis*, *Synechococcus cerdorum* were selected for the production of antimicrobial agents against five Gram-positive (*Bacillus subtilis*, *B. pumulis*, *Enterococcus faecalis*, *Staphylococcus aureus*, *S. epidermidis*) and three Gram-negative (*Escherichia coli*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*) bacteria, and two fungi (*Candida albicans* and *Saccharomyces cerevisiae*). The results of the antimicrobial activities of the methanol extracts exhibited high antimicrobial activity against some gram positive bacteria (*Bacillus subtilis* and *B. pumulis*), moderate activity against the some Gram negative organisms (*Escherichia coli*) and moderate activity against some fungi (*Candida albicans*).

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EFFECT OF PHOSPHATE BIOLOGICAL FERTILIZER ON SOME MORPHOLOGICAL TRAITS OF PURPLE CONEFLOWER IN WATER STRESS CONDITION

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Purple coneflower is common name of *Echinacea purpurea* (L.) Monch, is a perennial grass plant (1). One of the main benefits of this plant is increasing the immunity power of body against the illness factors. So it is used as an important drug in treatment and prevention of illnesses such as catch cold, influenza and infections (2). In order to study the effects of phosphate biological fertilizer on some morphological traits of *Purple coneflower* under water stress, an experiment was carried out by factorial method on the base of RCBD with three replication in the agricultural research station of Islamic Azad University, Tabriz Branch in 1388-89. Experimental treatments included water stress as the main factor on 3 levels (irrigation after 70mm evaporation from class A basin, irrigation after 120mm evaporation from class A basin and irrigation after 170mm evaporation from class A basin), Secondary factors included: biological fertilizer in 2 levels (not application and application of phosphate biofertilizer). The result showed that Biological phosphate fertilizer application had significant effect on Leaf Area Index, flowering branch number and biological yield. Application of water stress on Purple coneflower resulted 55.04% decrease in LAI and 41.46% in biological yield. The most effect on biological yield obtained of application of phosphate biofertilizer under water stress of 120mm was equal to 22.69%.

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EFFECT OF WITCHES' BROOM DISEASE ON ENANTIOMERIC RATIO OF CATECHIN IN MEXICAN LIME

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Catechin is belonging to the class of flavan 3-ols which has isolated from a variety of natural sources. This compound has two enantiomers with different physiological and biological effects [1-2]. Last reports showed that biotic and abiotic stresses might change the ratio of catechin enantiomers to cope with the given condition [3]. The present study concentrated on the chirality of catechin in the leaves of Mexican lime affected using Witches' broom disease. The concentration of catechin was monitored by HPLC method using C18 column in healthy leaves of Mexican lime and infected leaves of Mexican lime. The data revealed that the ratio of catechin in infected and healthy leaves of Mexican lime was 2.91. After collecting catechin from C18 column, it was analyzed using Eurecel 01 chiral column. The results indicated that the enantiomeric ratio of (+)-catechin to (-)-catechin was shifted from 60:40 to 80:20 in the infected leaves in comparison with the healthy leaves of Mexican lime. Our results suggested that increase in biosynthesis, accumulation and enantiomeric shift may be involved in lime response and resistance against Witches' broom causal agent.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



AN INVESTIGATION OF BORON EFFECT ON CELL WALL POLYSACCHARIDES AND PHENOLIC COMPOUNDS OF MARSHMALLOW (*ALTEAEA OFFICINALIS* L.) IN TISSUE CULTURE MEDIUM

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Marshmallow (*Althaea officinalis* L.), a popular herb from the Malvaceae family, is a perennial plant. Marshmallow has been known from ancient time as a medicinal plant. Its roots, leaves, and flowers were used as crude drugs in treatment of catarrhs of respiratory system, irritating coughs, in skin wounds, gastritis and oral cavities [1]. Therapeutic effects of marshmallow are due to various flavonoids, phenolic acids and polysaccharide mucilage [2, 3]. Boron (B) is essential micronutrients for plant growth and development. The main role of boron has been determinate in plant cell wall pectin; in addition, B is involved in the metabolism of nucleic acids, proteins, carbohydrates and phenolic compounds [4]. In present study we investigated the effects of boron on phenolic compounds and cell wall polysaccharides of suspension-cultured of *Althaea officinalis* cells. The cells were grown in a modified LS medium with 3 mg/L IAA, 4.5 mg/L NAA, and 0.2 mg/L kinetin. Cells of marshmallow were treated with 3 B levels (0.01, 0.1 and 1 mM of H₃BO₃ at deficient, normal, and excess conditions, respectively). The result showed that deficiency and excess boron supply increased the amount of pectin-bound phenolics in compared of control group. The flavonoid content of the cells treated with 1 and 0.01 mM B was also higher than of the cell under control condition. Maximum and minimum amount of cell wall polysaccharides (CWP) observed in 0.01 and 1mM B respectively. Boron in 0.01mM concentration increased the amount of pectin, but had no effect on pectin content in excess concentration, compared to the control group.

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WATER QUALITY ASSESSMENT IN SAFFRON ECOSYSTEMS

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Water quality is an important factor in plant growth and yield specially yield of saffron. In order to study water quality assessment in saffron ecosystems, a study was conducted in 2010 in Sarbisheh (South Khorasan). All information calculated based on actual data, collected from 50 water sources and 50 saffron farms watered from those sources. Age of farms was between 1 and 7 years. Statistical analysis was made and maps were produced by GIS. Results showed that pH, HCO₃, planting method, summer irrigation and corm size had a positive linear with yield. Age of saffron farms had the most pronounced effects on yield and was the most important component in all linear equation. With an increase in Ec, Mg, Na, HCO₃, SO₄, SAR, TDS indices, saffron yield decreased. However, the increase of CO₃ and pH improved saffron yield significantly.

CHEMICAL COMPOSITION, ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF SATUREJA AVROMANICA ESSENTIAL OIL AND EXTRACTS

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The volatile constituents in the essential oil of *Satureja avromanica*, growing wild in Kurdistan, Iran were investigated by capillary gas chromatography and gas chromatography–mass spectrometry for the first time. The major components of essential oil were Carvacrol and Caryophyllene. Air-dried plant material was macerated successively in Hexane, Ethyl acetate, Methanol and Water for 3 days at room temperature. Essential oil and different extracts were tested by different methods (DPPH, FRAP, ABTS, MIC and Disc Diffusion) for their *in vitro* antioxidant and antimicrobial activities. Polar extracts exhibited high antioxidant activity comparing to non polar extracts. Also the essential oils and different extracts indicated moderate to high antimicrobial activities.

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Kish Island



EVALUATION OF ANTIOXIDANT ACTIVITY OF POMEGRANATE (*PUNICA GRANATUM*)

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Antioxidant is defined as any substance that when present at low concentrations compared with those of an oxidizable substrate, significantly delays or prevents oxidation of that substrate. Therefore a search for antioxidants of natural origin has attracted increasing attention. Pomegranate (*Punica granatum*) is one of the rich sources of bioactive compounds that antioxidant activity of its peel and juice has been reported. The present work was undertaken with the objective of evaluating the antioxidant activity of 10 cultivars of Iranian pomegranate peel and juice by FRAP assay. Analysis of variance results showed that there was a significant difference among pomegranate cultivars for peel and juice antioxidants. Results showed that peel of cv. Lamsari-e-Behshahr and Naderi-e-Badrood had the highest (705.50 mmol.100g⁻¹) and the lowest (225.17 mmol.100g⁻¹) antioxidant activity, respectively. The highest (419.33 mmol.100L⁻¹) and the lowest (157.33 mmol.100L⁻¹) antioxidant activity of fruit juice were observed in cv. Lamsari-e-Behshahr and Shishe-Kap, respectively. The mentioned results clearly indicate that peel extract contains more antioxidants than does the juice. As pomegranate peels are used as waste portion of fruits, therefore; these wastes can be reuse or consume for their medicinal values [1-3].

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EFFECT OF AQUEOUS EXTRACT OF *DESCURAINIA SOPHIA* ON CASTOR OIL-INDUCED
DIARRHEA IN MALE RAT

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Diarrhea is one of the worldwide health problems and one of the most common causes of children's death. In the present experiment, effect of *Descurainia sophia* on castor oil-induced diarrhea was investigated. 24 male rats randomly were divided into 4 groups as follow: *Descurainia sophia* with doses of 400 or 600 mg/kg; Diphenoxylate 0.5 mg/kg; and control (vehicle). One hour after orally receiving of drugs or vehicle (normal saline 10 ml/kg), each animal was given castor oil (2 ml/rat) by an oro-gastric catheter. Then the rat was placed in a separate cage and observed for 5 h defecation to determine fecal quality, frequency, and weight. Data were analyzed by ANOVA followed by Tukey tests and p<0.05 was considered as significant difference. Both *Descurainia sophia* 600 (600 mg/kg) and Diphenoxylate attenuated weight loss percent, excretion's index and frequency of stool (p<0.002). Compared to the control group, *Descurainia sophia* 600 also decreased water content of stool (p<0.05). Conclusion: Extract of *Descurainia sophia* plant has the same effect as Diphenoxylate on attenuating castor oil - induced diarrhea symptoms and also reduction of fecal water content.



THE SURVEY OF SOWING DATE ON YIELD AND ESSENTIAL OIL OF *THYMUS DAENENSIS* IN DIFFERENT CUTTING IN KERMAN

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Thymus daenensis is a woody and perennial plant from labiatae family which has and extended uses in different drug industries and nowadays is plant in extensive areas of farms. This study was done to evaluate the effect of different harvests and the date of plant on yield and essential oil of *Thymus daenensis*, in the shape of randomized complete block design and 4 replicates. The treatments include the date of harvest, the first harvest in July and the second harvest in August, and the date of plant in tow level(the density of plant equal to 33.3 in m²).variance analysis of characters was done by the software mstat-c and the comparison of average was done by the means of Duncan's multiple range test. From agricultural characters were noted the height of plant, cover crown, wet weight yield, dry weight yield, economic yield, oil yield and percentage. The results showed that the effect of the date of plant on cover crown was significant and on other characters was not. However, the most economic yield from first harvest was observed as 2470 kilograms in hectare .Also the effect of the date of harvest on essential oil percentage, height of bush and wet weight yield was significant. The most essential oil percentage of the first harvest was 1.459%.although the date of plant wasn't significant, statistically, in this work, the most dry and wet weight yield was in autumn plant and first harvest. So, it is seemed, by considering the results that the dates of autumn plant are in priority over spring plant.

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EFFECTS OF ALLICIN ON THE LESIONS CAUSED BY EXPERIMENTAL LEAD POISONING IN COMMON CARP (*CYPRINUS CARPIO*)

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Lead poisoning is of special importance in all living creatures, as well as aquatic animals. Allicin, one of the main active components of garlic, is expected to play a protective role against lead poisoning, due to its abundant sulfur amino acids. In this research, the toxic effects of lead in common carps were studied, regarding severity of pathologic lesions. Five groups of 46 common carps (100±10g) were studied. The groups 2-5 received lead acetate at 7mg/L for 10 days. Groups 3 and 4 received daily amounts of 5 and 10mg allicin/KgBwt, respectively, beginning 5 days before lead acetate is added. Group 5 was the same as group 4, but received allicin for the same period as lead acetate. Brain, gill, kidney and livers of experimental fish were collected, processed, and stained with hematoxylin and eosin according to routine histology methods. The results were compared between groups by non-parametric kruskal-wallis test. For significant difference between groups, the Man-whitney test was used to compare the results between each two groups. P<0.05 was considered as significant difference. Histopathologic examination of brain according to Man-whitney test hyperemia and edema and ischemic change showed significant difference between group 2 and 4, 5. Kidney showed significant difference between group 2,3 and 2,4,5 in lesions including: degenerative and necrotic changes and hyperplasia of melanomacrophage. In liver hyperplasia of melanomacrophage hyperemia and edema between group 2 and 4, 5 showed significant difference. In gills according to Man-whitney test hyperemia, edema, hemorrhage lamellar configuration epithelial cell hyperplasia showed significant difference between group 2 and 4, 5. However, no significant differences were observed between groups 4 and 5 in this regard. The results of the present research suggest a potent effect for allicin in alleviating tissue injuries following lead poisoning.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



CYCLOTIDES FROM *VIOLA IGNOBILIS*: ISOLATION AND IDENTIFICATION

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Cyclotides are macrocyclic knotted peptides originating from plants. They are extremely stable and have a range of bioactivities including uterotonic, antimicrobial, anti-HIV, and cytotoxicity activity. Given the stability of the cyclotide framework there is interest in using these peptides as scaffolds in drug design. In this study, cyclotides isolated from *Viola ignobilis* and identified by mass spectrometry techniques. A purification step was done by solid phase extraction after extraction of plant material by dichloromethane/methanol. The more purified fractions of cyclotides obtained by preparative HPLC. Matrix assisted laser ionization/desorption time-of-flight mass spectrometry (MALDI-TOF MS) was applied for the analysis of cyclotides based on molecular weight and MS/MS fragmentation patterns. Interpretation of MS/MS spectra was performed according to de novo sequencing strategy. Furthermore, some enzymes like trypsin were used to obtain useful results from mass spectrometry. The present work reports 9 new cyclotides from *Viola ignobilis*.

COMPARATIVE ANALYSIS OF TOTAL PHENOLIC CONTENT IN DIFFERENT PART OF ESSENTIAL OIL OF *FERULA ASSA-FOETIDA* FROM SEVERAL REGIONS OF IRAN

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The aim of this study was to compare the total phenolic content (TPC) of essential oils of different parts of *Ferula assa-foetida* (including: root, oleo-gum resin and seed) collected of different localities of Iran. Hydro distillation by Clevenger-type apparatus was used for the extraction of essential oils. Total phenolics were determined using Folin-Ciocalteu reagent [1]. Essential oils or gallic acid standard solutions were mixed with Folin-Ciocalteu reagent (1:10 diluted with distilled water) and aqueous Na₂CO₃ 1M. After 15 min at room temperature, absorbance was measured at 765 nm by UV spectrophotometer. Results were expressed as µg gallic acid equivalents (GAE) /g DW. In according to our results, the lowest content of total phenolic content observed in root essential oil from Yazd and Tabas with 108.12 ± 2.26 and 220.7 ± 6.08 µg GAE/g DW, respectively. On the other hands, the highest content of total phenolic obtained in root essential oil from Khorasan and oleo-gum resin essential oil from Tabas with 2065.33 ± 45.45 and 1889.33 ± 34, respectively.

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DETERMINATION OF VOLATILE COMPOUNDS OF ESSENTIAL OIL OF *ACHILLEA TENUIFOLIA* LAM. FROM TEHRAN PROVINCE

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The essential oils of aerial parts of *Achillea tenuifolia* Lam., were extracted by hydrodistillation and analysed by gas chromatography equipped with flame ionization detector (GC-FID) and gas chromatography coupled to mass spectrometry (GC/MS), to determine the chemical composition of the volatile fraction and identify their chemotypes. Twenty seven constituents were identified. The essential oil yield and the percentage of identified compounds were 0.25 % (v/w) and 99.03% respectively. The major component was Germacrene D (58.56%), other predominant constituents were: Camphor (22.79%), 1-Terpineol (2.04%), β-Eudesmol (3.66%), p-Cymene (1.74%).



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



IN VITRO CYTOTOXICITY EFFECT OF *HYPERICUM PERFORATUM*

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Hypericum perforatum commonly called *St. John's wort*, is a plant native of Europe, but, has spread to temperate locations in Asia, Africa, North and South America and Australia [1]. In Iranian traditional medicine, *H. perforatum* is called "Alafé chay" or "Hofariqoon" [2]. In qanoon of medicine which was written by great Iranian scholar Avicenna mentioned that *H. perforatum* can be used for the treatment of oram. Due to Avicenna points of view oram is somehow related to cancer. In this study methanolic extract of *H. perforatum* was investigated for cytotoxic activity against different cancer and normal cell lines, i.e. MCF7, HepG2, HT-29, A549 and MDBK. The cytotoxicity effect of the sample was determined using the colorimetric methylthiazole tetrazolium (MTT) assay [3]. The methanolic extract was shown cytotoxic with $100 > IC_{50} > 60 \mu\text{g/ml}$.

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**MINERAL ION COMPOSITION OF FLORAL NECTAR OF *PEGANUM HARMALA* L.
(ZYGOPHYLLACEAE)**

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Mineral ion composition of *Peganum harmala* L. floral nectar was studied using atomic absorption spectrometer, spectrophotometer and flame photometer. Na^+ , K^+ , Ca^{2+} , Mg^{2+} , Po_4^{3-} and Cl^- were determined to be 234.00 ± 15.31 , 1.36 ± 0.15 , 0.38 ± 0.018 , 18.62 ± 1.28 , 113.93 ± 6.28 and 102.14 ± 12.13 ppm respectively. The analysis showed that Na^+ is frequent in the nectar of *p. harmala* probably due to its high concentrations in the adjacent tissues.

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Kish Island



ANTIFUNGAL ACTIVITY OF THE CITRULLUS COLOCYNTHIS HYDROALCHOLIC EXTRACT

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Iranian *Citrullus colocynthis*, belonging to the family of Cucurbitaceae is a very widespread medicinal plant [1]. It is traditionally used in Iran folk medicine for treating many diseases such as hyperglycemia, urinary, gastrointestinal and pulmonary infections [2]. In this study, the antifungal activities of *Citrullus colocynthis* extract obtained from its seed using the broth serial dilution (micro dilution method) was examined. The plant extract was assayed for antifungal activity in vitro activity against ten pathogenic fungi (*Candida albicans*, *Candida dubliniensis*, *Candida tropicalis*, *Candida parapsilosis*, *Candida krusei*, *Candida glabrata*, *Candida guilliermondii*, *Aspergillus fumigatus*, *Aspergillus flavus*, *Aspergillus niger*). 100 g of the air-dried and powdered *Citrullus colocynthis* was ground with a mixer and added to 500 ml of 70% EtOH. The mixture was allowed to be for 12 h and then filtered using filter paper (Whatman no.1) after that removed of the solvent by evaporation. The minimal fungicidal concentration (MFC) was determined by subculture on Sabouraud dextrose agar containing 0.05% Chloramphenicol (SC) agar at 37°C between 24 and 72 h. Anticandidal activity was reported as MIC and MFC [3]. All tests were performed in triplicate. Prior to test, each isolate was passaged on SC to ensure purity and viability. Amphotericin B was used for the antifungal positive control. *Citrullus colocynthis* hydroalcoholic extract showed significant antifungal activity against all the tested fungi. The results were showed Iranian *Citrullus Colocynthis* was active against fungi tested.

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EVALUATION OF GARLIC AND SWEET WORMWOOD ESSENTIAL OIL AGAINST OF ROOT-KNOT NEMATODE IN VITRO

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Plant-parasitic nematodes are major pests in many countries, particularly in the tropics and subtropics; the most destructive species is *Meloidogyne incognita* which causes serious problem and number of economically important agriculture and greenhouse crops. In this research the anti-nematode activity of Garlic and Sweet wormwood have been investigated against root-knot nematode (*Meloidogyne incognita*) in laboratory condition. Experiments were carried out with essential oil; concentration and time level using Randomized completely design as Factorial. For this purpose, the effect of Garlic and Sweet wormwood essential oil with concentration of 0, 50, 100, 200, 300, 400, 500 and 1000 ppm on the percentage of mortality of second stage juveniles were evaluated after 48 and 72 h. The results indicated that all of them had anti-nematode activity and showed most mortality in concentration 1000 ppm after 72h. The results showed the higher mortality in essential oil of Sweet wormwood in 90.37%, 93.33% and Garlic in 74%, 86.67 % in after 24 and 72h in concentration 1000 ppm. The results of this investigation showed that Garlic essential oil had most mortality. The results also revealed that the use of essential oil of these plants can be replaced with chemical nematicides for controlling root-knot nematode especially in greenhouses.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



AROMATIC PROFILE OF *SCUTELLARIA LUTEO-COERULAE* ESSENTIAL OIL GROWING WILD IN NORTH-WEST OF IRAN

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In this project, the essential oil of *Scutellaria luteo-coerulea* growing wild in north-west of Iran (Azarbayjane-sharqei) was examined by GC and GC/MS methods. The yield of total volatiles was 0.6% (v/w). A total of 32 compounds were characterized in the essential oil. The main components of the oil were: trans-Caryophyllene (23.86%) and Germacerene-D (18.63%). Other compounds present in appreciable amounts were Valencene (7.77%), Phytol isomer (6.04%), δ -Cadinene (4.51%), Spathulenol (4.34%), α -Copaene (3.4%), Dehydroaromadere (2.97%) and α -Cadinol (2.88%).

ESSENTIAL OIL DETERMINATION FROM *HYPERCUM LINARIOIDES* BY CHROMATOGRAPHY TECHNIQUES

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This experiment describes the chemical composition of the essential oil derived from the aerial part of *Hypericum linarioides* collected from Hamedan province. Hydrodistilled essential oil content from aerial part of *Hypericum linarioides* was found to be 0.15% (v/w). A total of 40 chemical constituents representing 98.40% of the essential oil tested were identified using Gas chromatography flame ionization detector (GC/FID) and Gas chromatography-mass spectroscopy (GC/MS). Germacerene D with contribution of 43.71% was found to be the principal constituent. Other important components identified were: α -Pinene (6.57%), Nonane (5.53%), trans-Caryophyllene (5.45%), α -Humulene (3.58%), δ -Cadinene (3.71%), α -Cadinol (3.21%) and β -Elemene (3.21%).

PHYTOCHEMICAL COMPOSITION OF *TEUCRIUM ORIENTAL* ESSENTIAL OIL FROM HAMEDAN PROVINCE

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The phytochemical compositions of the essential oil obtained from the aerial part of *Teucrium orientale* were evaluated. Gas chromatography-mass spectrometry (GC/MS) analysis of the isolated oil resulted in the identification of thirty-one compounds in the oil representing 99.11% of the total oil. Trans-Caryophyllene was the major constituent of the *Teucrium orientale* oil (30.61%). Other important compounds were Linalool (12.68%), Germacerene D (12.32%), Caryophyllene oxide (6.19%), α -Humulene (5.31%), β -Cubebene (4.46%) and Bicyclogermacrene (4.13%).



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF DROUGHT STRESS ON SOME MORPHOLOGICAL CHARACTERISTICS AND
ESSENTIAL OIL CONTENT OF SAGE (*SALVIA OFFICINALIS*)

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Drought stress is one of the important environmental factors that limit plant growth and productivity in the world. Sage (*Salvia officinalis*) is a perennial sub-shrub plant belonging to the Lamiaceae family. Sage's essential oil is used in pharmaceutical, perfumery and food industry. In order to study the effect of drought stress on some morphological characteristics and essential oil content and yield of sage, a pot experiment carried out in randomized complete blocks design with four treatments and five replications in green house. The drought stress treatments were: 100 (control), 80, 60 and 40% of field capacity. The results revealed that drought stress has significant effects on morphological characteristics and essential oil yield. As the soil water content decreased plant height, stem diameter, number and area of leaves, fresh and dry herb yield and essential oil yield decreased. There was no significant difference between drought stress treatments for essential oil content.

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ANTAGONISTIC EFFECTS OF *PROSOPIS FARCTA* AGAINST THE VENOM OF THE IRANIAN
SNAKE *ECHIS CARINATUS* IN MICE

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Access to immediate medical care can be vital for saving the life of envenomed victims because snake bites can be fatal if not treated quickly. Increasing the survival time after bite, could raise the chance of patients to admission medical care and the appropriate antivenin therapy on time. *Echis carinatus* with hemotoxic venom is one of the most deadly snakes in Asia and some parts of the Africa. *Echis carinatus* venom reduces most clotting factors including V, VIII, II and XIII and, by direct activation of prothrombin, affects blood coagulation that in turn causes haemostatic defect [1]. Studies show that *prosopis farcta* which is a bushy plant and has different pharmacological effects including wound healing and antibacterial. This study was conducted to evaluate the possible antagonistic effects of alcoholic extract of *prosopis farcta* seeds against the venom of the Iranian snake *Echis carinatus* [2]. Thirty adult albino mice weighing 35±5g were divided into five groups (A₁, A₂, B₁, B₂, and B₃) of 6 mice. Groups A₁ and A₂ as control groups, received the venom at 10 mg/kg and extract of *prosopis farcta* at 20 mg/kg, respectively. Groups B₁, B₂ and B₃ were treated with different doses of *prosopis farcta* and venom simultaneously. The average time to death in group A₁ was 81min while in group B₁ which received 20 mg/kg of *prosopis farcta* extract, increased to 144 min. In group B₂ which received 40 mg/kg of *prosopis farcta* extract, three mice did not die and the survival time of other three mice was 951 min. In group B₃ which received 80 mg/kg of *prosopis farcta* extract, only one mouse died after 1612 min. It should be noted that all mice in group A₂ which received *prosopis farcta* extract alone, remained alive. The administration route of venom and extract was IP injection. The results of this study for the first time showed that *prosopis farcta* has protective effect against fatality effect of *Echis carinatus* venom and significantly delayed time to death of envenomed mice. In conclusion, *prosopis farcta* can postpone the lethal effect of *Echis carinatus* venom, and therefore may have a potential therapeutic application in envenomating. The study still continues.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ANTIMICROBIAL PROPERTIES OF THE CHLOROFORM, ETHANOL AND WATER EXTRACTS
OF MEDICINAL PLANT *MALVA NEGLECTA* ON

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Many efforts have been made to discover new antimicrobial compounds from various kinds of sources such as micro-organisms, animals, and plants. One of such resources is folk medicines. Systematic screening of them may result in the discovery of novel effective compounds. The increasing prevalence of multidrug resistant strains of bacteria and the recent appearance of strains with reduced susceptibility to antibiotics raises the specter of untreatable bacterial infections and adds urgency to the search for new infection-fighting strategies. Contrary to the synthetic drugs, antimicrobials of plant origin are not associated with many side effects and have an enormous therapeutic potential to heal many infectious diseases. In this study, the efficacy of chloroform, ethanol and water extracts of *Malva neglecta* on some bacterial and fungal contaminants of wound infections were investigated. The results show that the acceptable efficacy of chloroform, water and ethanol extracts of medicinal plant *Malva neglecta* on some bacterial and fungal contaminants of wound infections. Among all obtained extracts, ethanol extract of *Malva neglecta*, showed the best activity against bacteria, followed by aqueous extracts. The best of antibacterial MIC values was 0.4 g/ml obtained with *S. pyogenes* cultures. Aqueous and chloroform extracts had better antifungal activity. All extracts had activity against *A. niger*, *A. fumigatus* and *C. albicans*. Our results show that all extracts are active against *S. aureus*, *P. aeruginosa*, *P. vulgaris* which have been reported to be troublesome bacteria in wound infections, especially in the aspect of antibiotic resistance as multi-resistant microorganisms. The ethanol extracts had the highest antibacterial activity than all other solvents. Anthocyanin of *Malva neglecta* has approved bacteriostatic activity. This water soluble pigment can be responsible for acceptable antibacterial effects of aqueous extracts of this plant. Our results add more reasons to the clinical application of these extracts in the prophylaxis and treatment of wound infections. The wide range of efficacy on different bacterial and fungal agents and possible healing acceleration obtained by these extracts makes them acceptable candidates for the promotion of healing in wound infections.

THE EFFECTS OF DIFFERENT LEVELS OF SALICYLIC ACID (SA) ON SUMMER SAVORY
MEDICINAL PLANT CHARACTERISTICS

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Summer Savory (*Satureja hortensis* L.) is an annual herbaceous plant that is one of the most pleasant spices. In order to evaluate the effects of different levels of salicylic acid on morphological and physiological characteristics of summer savory, an experiment was conducted as randomized complete blocks design with 3 replications in 2009 and 2010. Treatments were 3 times application of salicylic acid with one week interval at 0, 200, 400, 600 mg L⁻¹. Control plants were sprayed with distilled water. According to results of this experiment, difference levels of salicylic acid in summer savory had significantly effects on plant height, dry weight and axillaries shoots production, but there were no difference between levels of salicylic acid. The results of analyzing the oil with GC, GC/MS devices, it is specified between the declared compounds in all treatments (with the most and least compounds) Carvacrol, γ -Terpinene, α -Terpinene, β -Myrcene, *p*-Cymene, allocated the most measure to itself and Methyl chavicol, Geraniol, Neral, E-Caryophyllene were the major components in all treatments. Results showed that application of salicylic acid on summer savory (especially in 200 mg L⁻¹) increased moist and dry weight and axillaries shoots production in summer savory.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EVALUATION OF THE EFFECTS OF SALICYLIC ACID (SA) TREATMENTS ON AMOUNT,
PERCENTAGE AND COMPONENTS OF BASIL PLANT OIL

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Basil (*Ocimum basilicum* L.) is a plant that in addition to raw used, is selected to make fragrant the foods. In order to evaluate the effects of different levels of salicylic acid on morphological and physiological characteristics of summer savory, an experiment was conducted as randomized complete blocks design with 3 replications in 2009 and 2010. Treatments were 3 times application of salicylic acid with one week interval at 0, 200, 400, 600 mg L⁻¹. Control plants were sprayed with distilled water. Results indicated that treatments had significant effects on fresh and dry weight and yield of oil production and there were no significant differences between different levels of salicylic acid. In comparison to control, treatments significantly increased plant height, auxiliary shoot production, length of auxiliary shoots and oil percentage. The results of analyzing the oil with GC, GC/MS devices, indicated that the major components were Methyl chavicol, Geraniol, Neral, E-caryophyllene. Finally we found that salicylic acid application (especially at 200 mg L⁻¹) can increase the fresh and dry weight and auxiliary shoot production in Basil, and it is important due to food value of this plant.

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COMPOSITION OF THE ESSENTIAL OIL OF *FERULA ORIENTALIS* FRUIT BOISS. FROM IRAN

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The genus *Ferula* contains more than 130 species all over the world that its 30 species have been found in Iran [1]. The chemical composition of the essential oil obtained from fruit of *Ferula orientalis*, an indigenous Iranian medicinal plant which collected

From Dareh Ghasemloo (Shohada) in west Azarbaijan province and in altitude of 1350-2300 m, was determined by GC-MS analyses [2]. The major compounds were found to be Nonane (31/82%), α -Pinene (19/61%), 2-methyl octane (18/43%), 2- β -Pinene (3/08%), trans caryophyllen (2/42%).

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



IDENTIFICATION OF MEDICINAL PLANTS OF SEYED JAVADLO WATERSHED (ARDABIL PROVINCE) IN ORDER TO PROTECT THE GENOTYPES

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Vegetation of Seyed Javadlo Watershed in North West of Ardabil province with 1757 ha was studied in 1389. Results showed the total number of identified species by considering literature [1] is 133, which among them 68 species from 39 genus and 23 families are medicinal plants by considering literature [2]. The families of Asteraceae Lamiaceae and Fabaceae have the highest frequency of medicinal plants in the study area. The dominant life forms based on the Raunkiaer method [3], are Hemicryptophytes (He) with 39.70% (27 species) and Therophytes (Th) with 33.35% (22 species). The Chrotype of the identified species mostly belong to Iran- Turanian bioclimatic zone. In conclusion, for better management and protection of medicinal plants in Seyed Javadlo watershed we should: 1) to protect the genotypes of medicinal plants in this region it is required to collect and preserve the seeds of species in gene banks. 2) Introduce the identified medicinal species to the field of planting and markets of medicinal plants to use in similar ecological regions for planting. 3) Modify the current prevailing view of the watershed studies and rangeland-based management views to prevent the direct use of medicinal plants from natural habitats.

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PHENOLOGY OF MEDICINAL SPECIES *AJUGA CHAMAECISTUS* IN KORDAN HASHTGERD REGION

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Determination of plant phenology is important for setting utilization plans and proper use of medicinal plants. *Ajuga chamaecistus* is a woody species from Labiatae [1]. A study was done to examine different Phenology stages of *Ajuga chamaecistus* in Kordan site of Hashtgerd County during the 3 years. Ten species were selected and their phenological data and heights were measured in 15 days periods in the vegetative stage and 7 days periods in reproductive stage and data were recorded on special forms. Weather statistics including the average monthly temperature and monthly rainfall were obtained from the nearest weather station to the area and finally the obtained data were summarized and organized as tables. The results showed that the vegetative stage starts in late March and flowering stage last from mid-May to early June. Seed production and plants drying stages happen in early June and mid-September respectively.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF MASSAGE WITH/WITHOUT AROMATIC OILS ON PRURITUS RELIEF IN HEMODIALYSIS PATIENTS

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Pruritus is a common and troublesome side effect of end stage renal disease. It can directly influences on quality of life in affected patients. Unfortunately present treatment options are not successful in alleviating this symptom and yet kidney transplantation is the best option. Since one of the recent therapies in reducing pruritus is complementary medicine, the present study investigated the effect of massage with/without aromatic oils on alleviating pruritus. This study was a crossover clinical trial which has been performed in selected dialysis centers in Isfahan Medical University. Sampling was convenience and all hemodialysis patients who were dialyzed three sessions a week for 3-5 hours, and their pruritus score was more than 3 according to PSS, participated in the study. Subjects were randomly allocated in two groups. Participants in with/without aromatherapy massage group were delivered 6 sessions massage with aromatic oils firstly, and then after one week washout, delivered 6 sessions massage without aromatic oils, simultaneously In without/with aromatherapy massage group the order of interventions were vice versa. Each hand massage session took 7 minutes. 3-5 milliliters of aromatic oils (mixture of lavender, peppermint and tea tree oils which diluted to 5% by using sweet almond oil) or sweet almond oil were used in each session. In this study 40 patients participated in the investigation, were randomly allocated in two groups. The groups were matched in sex, age, underlying diseases, degree of xerosis and physiologic parameters but the length of being treated with hemodialysis were significantly different between two groups ($p= 0.03$). Analyses of data showed a statistically significant difference before and after both interventions in both periods ($p< 0.05$) but there was no significant difference between two interventions in both groups. Use of massage regardless to be with or without aromatic oils can significantly alleviate pruritus in hemodialyzed patients.

THE EFFECT OF SALVIA LERIIFOLIA SEED ON PERFORMANCE AND CARCASS COMPONENTS OF BROILER CHICKS

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This experiment investigated the effect of Salvia leriifolia seed on performance and carcass components of broiler chickens in a completely randomized design was conducted in 42-days period. Thus, of 250 one-day chickens Ross308, with 5 dietary treatments with five replicates of each treatment and 10 chicks in each replicate was used. The nutrient requirements of chickens were adjusted according to the recommended diet of Ross-308 Company. Dietary treatments was included the basal diet as a control (no addition of Salvia leriifolia seed), basal diet+ 0/5% Salvia leriifolia seed, basal diet+1% Salvia leriifolia seed, basal diet+1/5% Salvia leriifolia seed and basal diet+2% Salvia leriifolia seed. Feed intake, weight gain, feed conversion and mortality were measured weekly during the experiment .To investigate the effect of treatments on carcass components, slaughter and carcass analysis was performed on 42 days and the results were statistically analyzed. Data analyze showed that weight gain during the first week, feed intake in the second ,third and sixth weeks and feed conversion ratio in the fifth week was significant($P<0.05$). In different parts of the carcass, testis size showed significant differences in the different treatments ($P<0.05$).The results of experiment showed that Salvia leriifolia seed can improve performance.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF *SALVIA LERIIFOLIA* SEED ON BLOOD PARAMETERS AND HUMERAL IMMUNITY OF BROILER CHICKS

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This experiment was conducted to investigate of the effect of salvia leriifolia seed on blood parameters and humeral immunity of broiler chicks. In a completely randomized design, 250 One day-old broiler chicks were used and randomly allotted equally into five experimental groups with five replications and 10chicks in each replication .The nutrient requirements of chickens were adjusted according to the recommended diet of Ross-308 Company. Dietary treatments was included the basal diet as a control (no addition of Salvia leriifolia seed), basal diet+ 0/5% Salvia leriifolia seed, basal diet+1% Salvia leriifolia seed, basal diet+1/5% Salvia leriifolia seed and basal diet+2%Salvia leriifolia seed .Blood samples were taken on 21 and 42 days for measurement of total protein, glucose, and the titers of Influenza and Newcastle disease were performed. To evaluate the immune system after injection of 0.2 cc SRBC10% on day 14, blood sampling for immune globulins (Ig) was performed on 21 and 28days. The significant difference in blood glucose was observed in42 days (P<0.05).Amounts of total immune globulins, Ig G and Ig M at 21 and 28 days increased. But, the Ig G changes were significant (P<0.05).The results of experiment showed that Salvia leriifolia seed affect on glucose and humeral immunity.

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EFFECTS OF *ROSA DAMASCENE*, *NEPETA PERSICA* AND *NIGELLA SATIVA* EXTRACTS ON *STAPHYLOCOCCUS AUROUS* GROWTH

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Increasingly pathogenic bacteria resistant to Antibiotics, has hardened infectious diseases treatment therefore resulted in extra expenses. Usage of antimicrobial properties of some therapeutic plants has been considered from far past. Recent studies in this field indicate great importance and wide application of such plants. Some previous reportings mentioned *Nepeta persica*, *Nigella sativa* and *Rosa damascene* antibacterial effects. In this paper we try to reveal these 3 plants extracts effects on important pathogen *staphylococcus aureus*. We cultured staphylococcus aureus in order to calculate MIC & MBC with different concentrations by using Wall assay and DDS methods. Also in *Nigella sativa* its 33% seed oil was compared with new Mupirosin ointment on pustules in 40 infants.

MIC for *Nepeto persica* was 100mg/ml and MBC for aureus subtype ATCC-25923 was 200mg/ml and for subtype ATCC-29213 was 150mg/ml. *Nigella satica* in clinic alleviated pustules of all patients and no side effects was seen, however its therapeutic effects was approximately similar to Mupirosin. Its MIC for clinical samples was 0.25 to 0.5 and MBC calculated 0.6 to 21 mg/ml. about *Rosa damascene* MIC value was 1mg/ml and MBC 2.5 mg/ml. also death kinetic in 24 hours shows decrease in bacteria load in short period of time. *Nepeta persica*, *Nigella sativa* and *Rosa damascene* extracts not only show antibacterial effects against *staphylococcus aureus* isolations, but also reduce bacteria load in short period of time.



EFFECTS OF AMINO ACID ACTIVE COMPOUNDS ON LEAF BIOCHANGES OF *CALENDULA OFFICINALIS* L.

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Calendula officinalis L. from Compositae family as an important medicinal plant is used in Homeopathic methods and treatment of scalds and skin illnesses. This investigation is planned for the desirable effect of Amino Acid compounds foliar application on bio-parameters of plants. The experiment with completely randomized blocks design was conducted in 10 treatments with 3 replicates in 1390. Treatments of experiment included amino acid compounds with commercial formulation of Aminol forte, Kadostim, Fosnutren, Humiforte (0.75 and 1.5 L.ha⁻¹) and chemical fertilizer N, P, K (70 kg.ha⁻¹ before sowing) and control treatment (without foliar application). Results showed that effect of these treatments was significant (P<0.01) on 5 parameters (except for chlorophyll) in a way that the most effect on leaf fresh weight (3.583g), leaf dry weight (0.754g), relative water content (RWC) (138.58g) with Humiforte 0.75% and on leaf area (774mm²) with Kadostim 1.5% and the least effect on all of parameters was obtained with control. According to these results application of Humiforte and Kadostim is recommended because of existence of three macro elements Nitrogen, Phosphorous and Potassium and their positive effect on plant growth.

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SEED GERMINATION RESPONSES OF THREE IMPORTANT MEDICINAL PLANTS TO TREATMENTS OF ENVIRONMENTAL STRESSES, FE CHELATE NANOFERTILIZERS AND ALCOHOLS

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To investigate the effects of Salinity and drought stress (in osmotic potentials of 0, 50, 100, 150, 200, 250, 300, 350 mM with usage of NaCl and osmotic potentials of 0, -2, -4, -5, -6, -8, -10, -15 bar with usage of PEG8000 for drought stress), aqueous solutions of Methanol and Ethanol (in concentrations of 0, 0.4, 0.8, 1.2, 1.6, 2, and 3%) and Fe Chelate nano fertilizers (in concentrations of 0, 50, 100, 200, 400, 800, 1600, 2000 mg.L⁻¹) on seed germination of three medicinal plants, Dragon's head (*Lallemantia iberica* (M.Bieb.) Fisch. & C.A.Mey.), *Convolvulus arvensis* L. and *Ocimum basilicum* L., three experiments (regression analyze for salinity and drought stress on Dragon's head seed) were carried out on the basis of completely randomized design with 4, 3 and 3 replicates respectively in 1390. Results showed that effect of these solutions on all of the parameters (except for chlorophyll content in 3th experiment) was significant (P<0.01) in a way that in 1th experiment for salinity stress in germination percent and germination rate and seedling fresh weight the best treatment was osmotic potential of 100mM. For radicle length, hypocotyl length, and seedling dry weight a decreasing trend was observed with increase in osmotic potential. For drought stress in germination percent and germination rate the best result was obtained in -2bar. In radicle length, hypocotyl length, fresh weight and dry weight of seedling with increase of osmotic potential a decreasing trend is occurred. In 2th experiment Methanol in concentration of 0.4% as a germination inducer and Ethanol 3% as an herbicide are recommended and in 3th experiment the most effect was occurred in all of germination parameters and chlorophyll content in concentration of 2000mg.L⁻¹ and the least with control treatment.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



OPTIMIZATION AND COMPARISON OF PRESSURIZED FLUID EXTRACTION AND SUPERCRITICAL CARBON DIOXIDE EXTRACTION OF ESSENTIAL OIL FROM *LAVANDULA HYBRIDA* BY CENTRAL COMPOSITE DESIGN

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The essential oil of *Lavandula Hybrida* has multiple pharmacological activities [1]. Therefore, the extraction with high yield and quality is very important for preparation of essential oil of *Lavandula Hybrida*. In this paper, two methods, namely pressurized fluid extraction (PFE) and supercritical fluid extraction (SFE), for extraction of essential oil compounds from *Lavandula Hybrida* were optimized and compared by central composite design [2]. A central composite design method (CCD) was used to design the experiment and a mathematical model was constructed to investigate the relationship between the extraction yield and the effective variables such as temperature, pressure, dynamic extraction time, flow rate. The validity of the model was evaluated through the analysis of variance (ANOVA) technique by using Minitab software. A gas chromatograph (Agilent Technologies, model 6890N) was used with Helium (He) as the carrier gas, a HP-5 capillary column (30 m long, 0.25 mm I.D. and 0.25 µm film thick), and a flame ionization detector (FID) [3]. The results showed that PLE, and SFE were a practical techniques for separation of constituents such as 1,8-Cineole, linalool, linalyl acetate, and camphor from *Lavandula Hybrida* [4-5]. The result indicated that PLE had the highest extraction efficiency, while SFE had the best selectivity for extraction of Linalool and Linalyl acetate. The contents of ingredients from *Lavandula Hybrida* extracted with PLE and SFE are significantly different, which suggest that comparison of chemical components and pharmacological activities of different extracts is helpful to elucidate the active components in *Lavandula Hybrida* and control its quality [4-5].

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IDENTIFICATION, MEASUREMENT AND COMPARISON OF MATERIALS FORMED IN STEMS, FLOWERS AND LEAVES *EREMOSTACHYS MACROPHYLLA* WITH GC/MS IN SABZEVAR

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Eremostachys macrophylla plant north of Sabzevar village of white stone in the flowering stage were collected. Samples were dried in open air Oils and essential oil from different parts of the flower, leaf and stem of the steam distillation method and oil content was determined using Kelevenjer. Essential oil in the open air drying oils from various parts of flowers leaves and stems with water and distillation method of using essential oils were Klvnjrasthsal. Identification of essential oil constituents of oil mass spectra obtained from GC/MS and mass spectra comparison with reference standards (database system) was performed. Identification was confirmed by retention indices calculated for Kvats Kvats and indices were compared to standard materials. The results show that: Compounds detected in the stems of *E. macrophylla*, 96% is mixed with 12. Most of the compounds 1,10 di-epi-Cubenol 34 / 4%, Elemol with 24% and 8% Octadecane form. Identification of compounds in leaves 8 / 91% and the number of combinations is 10. Most α -Pinene compound with 30% and 1,10-di-epi-Cubenol with 22 / 7% and Elemol with 13 / 3 percent. Compounds in the flowers of 95/6% and 24 compounds are identified compounds. Combination 8,9-Cineol with 19% ,Germacrene D-4 -01 with 10 / 6 % and α -Pinene with 9 / 8% Most of the compounds are allocated to.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ECONOMIC DEVELOPMENT OF KELOSS (HERBAL AND SPICE PLANT) USING MECHANICAL METHODS IN PRIMAL PROCREATION AFTER HARVESTING

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Medical plants have been one of the most important sources of food and medicine for human along history. Fereidunshahr County has a high capacity of cultivability of medical plant as well as Kelossia. Properties of This medical plant have been found 600 years b.c. and this species have potential of export as s medical and spice plant. One of the most important points in procreation of keloss is drying the crop as soon as possible by using thermal and mechanical methods together. The purpose of this study is to compare between methods of drying and selection the best method with more benefit in the local. These ways are: 1) homemade solar siccative system, 2) industrial solar siccative system, 3) using thermal siccative method (fossil fuel), and 4) using empty capacity of available siccative factories in province. Results indicates that the best method (more benefit) is using empty capacity of available factories in province and in second order offer third method (thermal siccative method using fossil fuel), but the cost of 4th method is 6.63 times less than 3rd.

EXTRACTION AND ANALYSIS OF FATTY ACIDS IN LEAVES AND ROOT OF SCORZONERA PARADOXA FISCH. & C.A. MEY.

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Fatty acids, especially unsaturated fatty acids, are important as nutritional substances and metabolites in living organisms. Many kinds of fatty acids play an important role in the regulation of a variety of physiological and biological functions [1]. Easily detectable fatty acid derivatives by methyl or ethyl esterification with GC or GC-MS have been reported [2]. The fatty acids of interest are usually bound as esters in larger molecules in the sample matrix and the preparation of fatty acid methyl esters involves extraction of the lipid molecules from the sample matrix, breaking of the ester bonds, and formation of methyl esters. The two last steps may be combined by alcoholizing the lipids directly by acid or base in methanolic solutions [3]. Scorzonera Paradoxa Fisch. & C.A. Mey, with native name "Naghoodeshk, a member of Asteraceae or Compositae family, is used as vegetable in east of Iran, and is an adaptable plant of central sandy areas of Iran. Plant perennial, herb; tuber club form, long ovate; leaves ovate, acute, light green to blue or silver, rarely red, with silky hairs or almost glabrous, petiole short, flower purple to violet. Flowering time is May – June [4]. In this research, we evaluate lipid fractions of leaves and root of Naghoodeshk that were extracted with hexane. The lipids were esterified with 2% methanolic NaOH - 25% BF₃/methanol reagent. The fatty acid methyl esters were extracted with hexane/saturated NaCl and analyzed by gas chromatography –MS Spectroscopy (GC- MS).

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECTS OF SCORZONERA PARADOXA FISCH. & C. A. MEY. HYDRO ALCOHOLIC EXTRACT ON GLUCOSE AND LIPID PROFILE IN HYPERGLYCEMIC RATS

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Within the increasing interest to survive a healthy life, using traditional plants is presented as an alternative medicine and most of the people use these plants for their every day health care needs. Although some of the therapeutic properties attributed to plants have been proven to be erroneous, medicinal plant therapy is based on the empirical findings of hundreds and thousands of years [1]. Diabetes mellitus, as one of the most common global diseases, is considered to be a serious endocrine syndrome, affecting more than 200 million people worldwide [2]. Diabetes is associated with severe complications, such as diabetic nephropathy, neuropathy, and retinopathy [3]. *Scorzonera Paradoxa Fisch. & C. A. Mey.*, a member of Asteraceae or Compositae family, with native name “Naghoodeshk” is used as vegetable in east of Iran. Plant perennial, herb; tuber club form, long ovate; leaves ovate, acute, light green to blue or silver, rarely red, flower purple to violet and flowering time is May – June [4]. In this research, we induced diabetes in Wistar rats by a S.C., subcutaneous injection of alloxan monohydrate (100 mg/kg) in NaCl 0.9%. Extract of Nagoodeshk and glibenclamide were administered orally to alloxan diabetic rats. Overnight fasted rats were sacrificed and blood was collected for various biochemical estimations including mean blood glucose, serum insulin, cholesterol and triglycerides.

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THE STUDIES PRODUCTION AND EXPORT COMPARATIVE ADVANTAGE OF SELECTED MEDICINAL PLANT

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One of the important standard for production, export and import planning is relative profit and means a country or a region ability to produce one or more low-price based goods. This research studies the existence or absence of production and export comparative advantage of medical plants (fennel, sweet-root, cumin-seed and tobacco) in Iran and its changes process during a period (1996-2008) and also studies the competition degree (comparative advantage) of medical plants between major exporter countries of the world during the period of research. For this purpose, we have used of available information in Trade Ministry Research State, also food and agriculture organization (FAO), Agricultural Holy War Statistics and Custom Statistic of Iran Islamic Republic. The relative profit of plants production was studied in provinces with the highest level of plant in 1389 that except the medical plant of sweet-root, which is wild and don't grow, was computed by using DRC index. Also export relative profit of medical plants studied, evaluated by using trade indexes of revealed comparative advantage (RCA) and its revealed symmetric comparative advantage (RSCA) over 1996-2008 for Iran and also Iran's competition place between major exporter countries of medical plants studied in the period of the research. Studies show that mentioned provinces have the production relative profit to produce this plant and also some countries such as Iran, Turkey, Syria, Singapore, Czech Republic and India have revealed relative profit for cumin-seed plant, and India and Poland and Germany have increased export growth. According to sweet-root, studies showed that Iran in exporting this plant haven't trade relative profit while Italy have high trade relative profit in sweet-root export. Although tobacco plant have the 27th rank in Iran in 2005 but haven't export relative profit and finally fennel export haven't relative profit in Iran too. Thus, government protection of producers to increase their product was useful and effective and policy continuance is for encourage other producers to grow medical plants in mentioned regions and government protection of exporters in cumin-seed export and sweet-root in recent years have influenced, however; we can reflect these protections, about two other products due to the lack of export relative profit, to the other agricultural parts in order to have more dollars in this part.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EVALUATION OF AMOUNT OIL EXTRACTED OF SEED MEDICINAL PLANTS *NIGELLA SATIVA*, *FOENICULUM VULGAR* AND *PORTULACA OLERACEA* BY DIFFERENT SOLVENTS

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This study was accomplished in order to determine the effect of different solvents on the amount and percentage of oil extracted from seeds of several medicinal plant species by solvents of Diethyl ether (C₄H₁₀O) and n-Hexane (C₆H₁₄) include 2 levels and the seeds contains Black cumin (*Nigella sativa*), Fennel (*Foeniculum vulgare*) and Purslane (*Portulaca oleracea*). The experimental design was conducted on the base of Complete Randomized Design (CRD). The experiment was conducted in the lab with three replication. After crushing the mentioned seeds, their oil extracted by soxhlet equipment in boiling point of solvents for 3 hours. The results showed that between two solvents used in the extraction of oil, there are significant different (P≤0.001) so that Diethyl ether in extraction oil showed high level (14.75). In addition, oil of Black cumin seed and Purslane seed obtained maximum amount of oil (15.919% and 14.02% respectively). The comparative mentioned seeds, Fennel with (3.986%) showed minimum oil.

EFFICACY OF CHLOROFORM, ETHANOL AND WATER EXTRACTS OF MEDICINAL PLANT *MALVA SYLVESTRIS* ON SOME BACTERIAL AND FUNGAL CONTAMINATION OF WOUND INFECTIONS

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Concerns about the safety of some chemical preservatives and negative consumer reactions to chemical and artificial preservatives have increased, and more “natural” and “green” alternatives for the maintenance or extension of product shelf life have been considered. Particular interest has focused on the potential applications of plant extracts and essential oils. Valuable gains have been documented on the bactericidal, bacteriostatic, antifungal and immune-modulatory properties of these *Malva sylvestris* extracts. The present study investigates the efficacy of chloroform, ethanol and water extracts of these medicinal plants on some bacterial and fungal contaminants of wound infections. Among all obtained extracts, ethanol extract of *Malva sylvestris*, showed the best activity against bacteria, followed by aqueous extracts. The best of antibacterial MIC values was 0.4 g/ml obtained with *S. pyogenes* cultures. All extracts were active against *S. aureus*, *P. aeruginosa*, *P. vulgaris*. Aqueous and chloroform extracts had better antifungal activity. The best of antifungal MIC values was 0.6 g/ml for *Malva sylvestris* aqueous extract against *A. niger* cultures. All extracts had activity against *A. niger*, *A. fumigatus* and *C. albicans*. Our results show that all extracts are active against *S. aureus*, *P. aeruginosa*, *P. vulgaris* which have been reported to be troublesome bacteria in wound infections, especially in the aspect of antibiotic resistance as multi-resistant microorganisms. The results suggest that essential oils as non-polar organic compounds could be the main active compounds in this plant. Anthocyanin of *Malva sylvestris* has approved bacteriostatic activity. This water soluble pigment can be responsible for acceptable antibacterial effects of aqueous extracts of both plants. Our results add more reasons to the clinical application of these extracts in the prophylaxis and treatment of wound infections. The wide range of efficacy on different bacterial and fungal agents and possible healing acceleration obtained by these extracts makes them acceptable candidates for the promotion of healing in wound infections.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



AN EXAMINATION OF THE EFFECT OF LEAD STRESS AND SALICYLIC ACID INTERACTION
ON PROLINE AND PHOTOSYNTHETIC PIGMENTS IN (BERAHNE) OATS (*AVENASATIVAL*.)

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The level of lead concentration, as one of the heavy metals, is increasing in the environment as a result of human activities. Lead is one of the most serious pollutants in the environment and a physiologic toxic material that could harm different parts of human body. In the same vein harmful effects of lead have been recognized in other living creatures such as planets. The lead toxicity would decrease photosynthetic pigments, in planets [2]. Salicylic acid is an anti-toxic compound from Phenolic compounds group that plays a vital role in ion absorption and material transfer. Causing specific changes in the chloroplast structure of the plant, salicylic acid protects the plants from diseases and stresses. Oats is one of the herbs with multiple functions from Poaceae family and it is labeled (*Avena sativa* L.). This herb has nutritive, laxative, sedative, and healing properties. Moreover, it is a nourishing food for children and a solution for patients' weakness in disaster recovery period. The herb contains compounds such as Avenin and gliadin and B complex vitamins. The oat bran has medical properties and it has no side effect [1]. In the current study, (berahne) oats by Karaj Institute have been used. The oats were grown in hydroponic culture during a ten-day period. Lead and salicylic acid were applied in the culture as lead nitrate in 0, 0.5, 1, 1.5, 0mM concentrations and salicylic acid in 0 to 10 μ M concentrations. The experiments were done in completely randomized design with four replications and a control group for measuring total chlorophyll, chlorophyll a and b, proline and carotenoid. The findings of the current study indicated that the chlorophyll (a, b, and total) concentration and carotenoid had a significant decrease in the presence of 0, 0.5, 1, 1.5, mM concentrations of lead nitrate ($p < 0.05$). On the contrary, in the interaction of different concentrations of lead and 10 μ M concentration of salicylic acid a raising trend was observed. It should be notified that the proline concentration shows a significant increase in crops and roots in the presence of 0, 0.5, 1, 1.5mM concentrations of lead nitrate ($p < 0.05$). On the other hand 10 μ M concentration of salicylic acid improves the conditions of plant stress.

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THE EFFECT OF *ANETHUM GRAVEOLENS* HYDROALCOHOLIC EXTRACT ON PENTYLENETETRAZOL (PTZ)-INDUCED CHEMICAL KINDLING IN MICE

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At present there are many antiepileptic drugs with a wide range of side effects on human body. *Anethum graveolens* has antispasmodic, anti acid, anti-bloating and antiseizure activity in folkloric medicine. The aim of the present study is to elucidate the effect of *Anethum graveolens* hydroalcoholic extract on pentylenetetrazol (PTZ)-induced chemical kindling. In this experimental study, 50 mice in 5 separate groups were used. All groups received 11 separate intraperitoneal injections of PTZ (40 mg/kg) with two-day intervals. 30 min before the injection of PTZ, two groups of mice received saline and diazepam (10 mg/kg) respectively. Three other groups received hydroalcoholic extract of *Anethum graveolens* (150, 300 and 600 mg/kg) 30 min before the injection of PTZ. Almost all of the kindled mice treated with saline showed seizure-related behaviors after 2nd injection of PTZ up to the end of study while the number of seizure-related behaviors in mice treated with hydroalcoholic extract (150, 300 and 600 mg/kg) was much lower in compare with saline-treated mice. The present findings showed that the hydroalcoholic extract of *Anethum graveolens* reduced both the numbers and the severity of seizure attacks in PTZ-induced chemical kindling in mice. Since the drugs that control PTZ-induced seizures are able to control myoclonic seizures in human, the extract of *Anethum graveolens* may be a candidate to control this kind of seizures.

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DETECTION OF ANTIMICROBIAL EFFECT IN VARIOUS PARTS OF *HYPERICUM PERFORATUM* AND ITS COMPARISON WITH HYPIRAN DROP

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Antimicrobial effects of essential oil and extract of different part of different part *Hypericum perforatum*, and hypiran drop were investigated. To best of our knowledge there has been no report on antimicrobial activity of *Hypericum perforatum*. However, in other species such activity was reported. Several studies have shown that flowering parts of the plant contain different amounts of essential oil Hypiran drop is used as an antidepressant and antimigrain agent in Iran and Germany. Essential oil was extracted by water and steam distillation methods. After drying and milling, the methanolic extract was obtained using succalate and maceration methods. Methanol was evaporated under reduced pressure. Five different microorganisms (Gram Positive, Gram Negative and Fungi) were used in this study (PTCC-1023) *Escherchia coli* (PTCC-1330), *Pseudomonas aeeeroginosa* (PTCC-1047) and *Candida albicans* (PTCC-5027).

Antimicrobial effects of extracts obtained by soxhlet and maceration methods of *H. Perforatum* were compared to each other. All extracts inhibited the growth of microorganism in the plate, except the stem extract which did not show any antimicrobial activity. Statistical calculation shows that extracts obtained by both methods had the same antimicrobial effects and the extracts obtained by both methods had the same antimicrobial activity. Statistical calculation shows that extract obtained by both methods had the same antimicrobial effects and the extraction method did not have any effect ($P < 0.05$). Also Hypiran drop was investigated for its antimicrobial activity. After removal of preservative it was shown that it inhibited the growth of *Staph. Aureus* and *B. subtilis*. Also the essential oils of *H. perforatum* had no antimicrobial activity in paper disc method, but antimicrobial activity was observed when ditch-plate method was used. In statistical analysis was investigated antimicrobial effects of root, flowe and leaf extracts and essential oil of *H. perforatum* and Hypiran drop on 50 hospital species of pathogen *Staph. Aureus*. In this case antimicrobial effects were observed.

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EFFECTS OF DIFFERENT LEVEL OF *ALOE VERA* ON IMMUNE RESPONSE AND SOME HEMATOLOGICAL PARAMETERS OF COMMON CARP (*CYPRINUS CARPIO*)

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Aloe vera inner gel possess polysaccharides have been shown to act as an immunostimulant and adjuvant in mammals, but there are few works on immunostimulating effects of *Aloe vera* in fish. Then this study was conducted to evaluate the effects of different level of *Aloe vera* as a food supplementation on nonspecific immunity and some hematological factors of common carp. Three hundred juvenile *C. carpio* were divided into 4 equal groups each group, in the three replicates contained 25 fish. The first group (G_1) was given the basal diet containing 0.1% Aloe crude-extract (ACE). The second and their groups (G_2 and G_3) were given the basal diet containing 0.5% and 1% ACE respectively. The fourth group was fed on the control diet (diet free from ACE). The fish were hand-fed twice daily ad libitum for 60 days. Blood samples were taken at day 60; Samples were used for immunological parameters: Lysozyme activity, serum bactericidal activity, Alternative complement activity, respiratory burst, as well as hematological factors (WBC, RBC Hb and PCV). Results showed that lysozyme and serum bactericidal activity, respiratory burst and WBC value were significantly increased in G_2 and G_3 compare to control ($P < 0.05$). Alternative complement activity, RBC, Hb and PCV showed no significant change among groups ($P > 0.05$), exception of reduction in Hb and PCV in G_3 treatment. To conclude, we have found that G_2 had the best stimulation effects on *C. carpio* immune system. Although stimulation of immune response was seen in G_3 , some adverse effect on hematological parameters induces in this group. Then food supplemented with 0.5% ACE can be used as immunostimulant in *C. carpio*. This concentration of Aloe doesn't have any adverse effect on hematological parameters of *C. carpio*.

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16, 17 May 2012
Kish Island



THE USE OF GROUP CONTRIBUTION METHOD FOR PREDICTING THE SOLUBILITY OF CATECHINS IN DIFFERENT SOLVENTS

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Green tea leaves contain different antioxidant which are an important anticancer agent. Consequently, they use widely in food, cosmetic and pharmaceutical industry. However, the extraction some of this antioxidants is simultaneously with extraction of another no useful ingredients. A group contribution technique was used to estimate the solubility parameter of catechins in green tea [1]. In this investigation, Hildebrand solubility parameter for six kinds of green tea antioxidant and ten solvent was calculated and the most effective solvent for each of these catechins was estimated and compared with laboratories data [2, 3]. The results show that the best solvent for EGCG and ECG extraction is Acetonitrile while for EC, GC, EGC, C, GCG extraction ethanol is preferred.

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SURVEY THE EFFECT OF SOME CRITICAL FACTORS ON HAIRY ROOT PRODUCTION IN *ARTEMISIA ABSINTHIUM*

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Artemisia absinthium is an annual and aromatic plant containing the anti malaria, artemisinin. One method for increasing production level of artemisinin in this plant is the use of the hairy root system. To introduce hairy roots *in vitro* leaf discs of *A. absinthium* the effect of *Agrobacterium rhizogenes* (15834 and GMI534 strains), acetosyringon (at 0.0 and 50mM) and carbon source (sucrose, sorbitol, glucose each at 30mg/L) and the media free of a carbon source (as control) were studied. Results indicated that, the GMI534 strain was more predominant compared to strain 15834 in producing hairy root percentage (64.06%), the mean number of hairy roots (8.83) and the mean of hairy root length (4.95). Besides, to induce hairy roots, the presence of carbon source was necessary and compared to the other carbon sources. Glucose increased hairy root percentage up to 92%. Results also revealed that acetosyringon alone had not a significant effect on the above traits. However its interaction with strain was significant.

DECOLORIZATION OF GREEN TEA EXTRACT USING DIATOMACEOUS EARTH AND THE STUDY OF ITS INFLUENCE ON THE QUALITY AND QUANTITY OF CATECHINS AND CAFFEINE CONTENT

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The common purification processes of green tea extraction include decolorization, decaffeination and demineralization [1]. Within the pharmaceutical and food industry, there are many process streams which require purification by some means or another. Typically, this requires that a specific impurity is removed or that a range of impurities are eliminated. In the later case, these impurities are never fully characterized and are generally given the name "color species". In all cases, the "color" is regarded as impurity which must be removed in order to avoid any adverse quality problem with the final pharmaceutical and food product [2]. In order to obtain the colorless green tea extraction that the food industries need, the earth diatomaceous influence on decolorizing of green tea was investigated. Diatomaceous earth is approved for use as a food additive in Japan and widely used in the manufacturing industry worldwide to refine beverage [3]. For this research different proportions of earth diatomaceous to green tea such as 1:20, 1:2 and 1:1 were studied and the results demonstrate that the most effective ratio is 1:20 that show the minimum catechin absorption and maximum absorption of caffeine respectively 13.30% and 16.40%

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ADVENTITIOUS SHOOT REGENERATION IN *ARTEMISIA ABSINTHIUM*, THE EFFECT OF HORMONAL CONCENTRATION

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Artemisia absinthium seeds were cultured in media containing various amounts of NAA and BAP. Callus cultures were induced from leaf, stem and root explants. The effect of NAA (0, 0.1, 0.5 and 2 mg/L) and BAP (0, 0.5 and 2 mg/L) callogenesis, organogenesis and rhizogenesis were assessed. Results indicated that the presence of both BAP and NAA was necessary for adventitious shoot regeneration (ASR). The best regeneration occurred in the presence of 0.5 mg/L BAP and 0.1 mg/L NAA. Moreover, by increasing BAP and NAA concentrations, the ratio of ASR decreased significantly. The highest shoot regeneration (55%) obtained by using 0.1 mg/L NAA and 0.5 mg/L BAP. The highest mean number of shoot regeneration (3.15) observed in the presence of 2 mg/L BAP and 0.1 mg/L NAA. In addition, the highest mean number of rooting (7.7) was observed when 2mg/L NAA was used.

ANTIBACTERIAL EFFECT OF *THYMUS* EXTRACT ON INTESTINE MICROFLORA COMPOSITION IN JAPANESE QUAIL CHICKS

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The aim of this work was to evaluate the effect of *Thymus* extract (*Thymus vulgaris*) on intestine microflora composition in meat Japanese quail. Plant extracts have been reported to increase the number of lactic acid bacteria in the ileum contents of broiler chickens, also Plant extracts decrease coliform counts. Stimulation of favorable bacteria such as lactobacilli could contribute to a balanced gut microflora, and provide an optimal precondition for effective protection against pathogenic microorganisms [2]. *Thymus* extract has antimicrobial properties that are mainly related to its Thymol and Carvacrol contents [3]. Therefore we used *Thymus* extract in Japanese quail chicks diet. One hundred and twenty one-day-old Japanese quail chicks were used in the experiment. Japanese quail chicks were allocated into two dietary treatment groups with four replicates, in a complete randomized design. The treatments were as follow: 1. Control (basal diet, without any added compounds), 2. Basal diet+1ml *Thymus* extract/Litr water. The data were analyzed using GLM procedure of SAS. At 35d, intestinal populations of lactobacilli, total aerobes and coliforms were enumerated in the small intestines. Lactobacillus populations were significantly higher ($P<0.05$) in the intestine of birds receiving *Thymus* extract than in the birds given the control diet. Significantly lower populations ($P<0.05$) of coliforms were enumerated in the small intestine of birds fed *Thymus* than Control dietary treatment, but the effect of *Thymus* extract on intestinal total aerobes bacteria was not significant. *Coli form bacteria* is an indicator tool for intestinal performance, so extracts affects pathogenic bacteria by changing cell wall bacterial penetrability leading to pore formation and osmotic shock and leakage of cytoplasm and its active contents out-side the cell and it leads to their death. On the other hand, plant extracts stimulate the growth of beneficial intestinal microflora, so it reduces the presence of Gram-negative bacteria like *Coli form*. Thus, feeding *Thymus* extract might be beneficial in terms of the growth of various enteric pathogens [1].

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DETERMINATION OF TOTAL CAROTENOIDS CONTENTS OF CARROTS HARVESTED FROM SOME REGIONS IN KHUZESTAN AND ISFAHAN PROVINCES

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Carotenoids are colorful compounds which may be effective in prevention of some cancers and act as antitumor [1, 2]. One of the richest sources for carotenoids is carrot (*Daucus carota*) which extensively grows in southern and central provinces of Iran. The amount of carotenoids in carrots can be varied by regions of growing and also weather conditions. Since information on the contents of carotenoids is of importance to public and has merit for further curative aims; therefore, this study was carried out to measure total carotenoids of carrots grown in some regions of Isfahan and Khuzestan provinces. Three regions of carrot cultivation which placed in Isfahan and Khuzestan provinces were selected and from each region thirty samples were taken. Khomeinishahr, Zarinshahr and Dastgerd from Isfahan province and Dezful, Andimeshk and Shoushdanial from Khuzestan province were considered for collecting the samples. The samples then were analysed for their carotenoids levels based on Arnon's method [3]. Briefly, the samples homogenised, extracted by 80% acetone and centrifuged at 8000 rpm and finally their absorbance were read by UV/Visible spectrophotometer. The ranges of total carotenoids contents in carrots of the selected regions were from 15.60 to 62.80 mg/kg of fresh weight. Carrot samples taken from Andimeshk were found to have the highest amount of carotenoids with average of 54.62 ± 5.54 mg/kg of fresh weight. The greatest amount of carotenoids in carrots of Isfahan was related to Khomeinishahr with average of 26.25 ± 1.80 mg/kg of fresh weight. Since the carotenoids is accounted as a vital source for vitamin A which has substantial role in biological processes; therefore the carotenoids from southern regions may have a further role for curative aims.

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EFFECT OF FOUR DIFFERENT DRYING METHODS ON PHYSICAL PROPERTIES OF SAGE LEAVES

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Sage has simple leaves which contain an enhancement aromatic odor and use for medicine and perfumes. Since drying process conditions affect physical properties of dried products, the least changes in these properties indirectly shows that the product has not been thermally damaged and changes in quality attributes is at minimum level. Thickness, area, mass and color are the most physical characteristics that can be considered as important indices in evaluating of the leaves quality. In this study, to determine a suitable drying method for sage, changes commencing the process on physical properties of material were investigated. For this purpose, four drying methods involving oven drying, shade drying, sun drying and freeze drying methods were evaluated. The results showed that drying method significantly affect the physical structure of sage leaf.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



COMPARATIVE EVALUATION OF ST JHON'S WROT AND PASSION FLOWER EFFECT ON SOME MENOPAUSAL SYMPTOMS

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Because of being associated with changes and complications, menopause is a critical and sensitive period. Its common symptom include: vasomotor signs, psychologic changes and sleep disorders, witch could influence on work, social tasks, quality of life and the sense of wellbeing. Usually Hormon replacement Therapy (HRT) is the treatment option that is associated with side effects and lots of women do not desine to use it and it has contraindicated for some else. Nowadays after hormone therapy the attention is toward Selective Reuptake Serotonin Inhibitors (SSRI_s), so accordingly to these effects of St John's wort and passion flower, we use them for reducing menopause symptom. This prospective clinical trial was performed in Isfahan, in 1388. 59 menopausal women who had include criteria, were participated in the study. The sampling was convenience and the subject were allocated randomly to two groups (n=30 St Johns wort and, n=29 in passion flower group). Demographic data were collected through personal charchtric questionace. Kopperman index was used for menopausal symptoms, witch was filled in 3 periods: before prevention, third week and sixth week of intervention. the results has shown that the means of total menopausal symptom score in both groups(St john's wort and passion flower) in the third and sixth week of intervention were statistically significant ($p<0.05$). But there were no significant differences between two groups. So both herbs reduced the menopausal symptom similarly. regarding to the effect of St john's wort and passion flower on treatment of premature menopausal symptom(vasomotor, insomnia, depression, nervousness, headache,...), at least the usage of these herbs are suggested for all women who are contraindicated for HRT.

FIELD EVALUATION OF DROUGHT TOLERANCE IN DIFFERENT GENOTYPES OF SESAME (*SESAMUM INDICUM L.*)

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As an excellent source of phytoosterols, Sesame (*Sesamum indicum L.*) seeds are efficient immune enhancer. It is also believed that they can help as prevention against certain forms of cancers. In order to study the effect of drought stress on sesame genotypes, a split plot experiment was carried out based on a Randomized Completely Block Design with two replications. The irrigation regimes compromised of Full irrigation (I₁), Moderate drought stress (I₂) and severe drought stress (I₃). The subplots were allocated to ten different genotypes of sesame. In this experiment different characteristics including plant height, number of the secondary branches, number of capsules, 1000- seed weight, number of seeds per capsule, seed yield, biological yield and harvest index in ten genotypes of sesame were measured. Analysis of variance showed that there was significant difference between genotypes for all of the studied traits, except for harvest index (%). Irrigation intervals had significant effects on number of seeds per capsule, 1000-seed weight, biological yield and seed yield. Interaction effect of irrigation × genotype was significant for plant height, number of capsules per plant, seed yield and biological yield. Increscent of drought tension reduced the means of primary branches per plant, number of seeds per plant, 1000-seed weight, seed yield and biological yield, significantly. Different tolerance indices including MP, TOL, SSI, STI and HM were calculated for evaluated drought tolerance of studied genotypes. The genotypes of Darab14 and Gorgan had the most and the least seed yield with the means of 2079.1 (Kg/m²) and 401.4 (Kg/m²), respectively.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



INVESTIGATION OF ANTINOCICEPTIVE EFFECT OF HYDROALCOHOLIC EXTRACT OF
NEPETA MENTHOIDES AERIAL PARTS IN MALE MOUSE

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The application of herbal plants instead of synthetic drugs is increasing in recent years because of their lower side-effects and high varieties of efficient components [1]. The study of antinociceptive effect of hydroalcoholic extract of *Nepeta menthoides* seems to be necessary due to the existence of its antinociceptive component [2]. This study has been done on 56 NMRI male mice of 20-25 g in weight. We used Formalin Test for demonstrating its antinociceptive effect. In this test, the animals were divided into 6 groups (each group consisting of 8 mice): Sham, Positive Control (receiving morphine at dose of 10 mg/kg in formalin test [3]), experimental groups receiving hydroalcoholic extract at doses of 70, 350, 700, 1400 and 2800 mg/kg. This study shows that *Nepeta menthoides* aerial parts decreased nociception meaningfully in chronic phase (at doses of 1400 and 2800 mg/kg ($p < 0.001$)). Dose of 2800 mg/kg had the most antinociceptive effect in chronic phase. The hydroalcoholic extract of *Nepeta menthoides* has antinociceptive effect. This effect maybe from its Nepetalactone component [2].

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ANALYSIS OF FLAVONOILIGNANS IN DIFFERENT ORGANS OF
SILYBIUM MARIANUM IN GORGAN REGION

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The main components of *Silybum marianum* are various flavonolignans consisting of silibinin, isosilibinin, silychristin, silydianin and taxifolin that are known as silymarin. In this study for the first time different organs of *Silybum marianum* (young and old leaves, stem, root, inflorescence and seeds) were separately collected during the different months in the Gorgan region and then total flavonoid, silymarin content, and the amount of silymarin components were measured by HPLC method. The current results showed that the highest amounts of total flavonoid were in the seed and inflorescence samples. The highest amounts of silymarin were observed in the seed ($32.779 \text{ mg g}^{-1} \text{ DW}$) and after that in the old stem samples ($17.883 \text{ mg g}^{-1} \text{ DW}$). The major flavonolignan of seed sample was silybin B and toxifolin. Meanwhile these results showed that the effect of time on flavonolignan content and also the effect of sampling month on flavonolignan content are significant. Data from the HPLC analyses revealed that the silymarin compositions were the same among different samples, but the main difference was the amount of silymarin composition. The highest amount of silydianin was observed in the stem sample however the amount of other components were higher in the seed sample.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



OPTIMIZING OF *SILYBIUM MARIANUM* TISSUE CULTURE TO PRODUCE SILYMARIN

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The *Silybum marianum* is an annual or biannual herbaceous plant from Asteraceae which is important in medicinal industry. The main components of this plant are various flavonolignans consisting of silibinin, isosilibinin, silychristin, silydianin and taxifolin that are known as silymarin. This plant is used in treatment of heart diseases, diabetes, blood cholesterol, liver diseases (jaundice, cirrhosis and hepatitis), and gallbladder disease. The purpose of this work was optimizing of *Silybum marianum* tissue culture for silymarin production in tissue culture system. In this research, callus formation has been investigated in root, leaf and petiole explants under different concentration (0, 0.1, 0.5, 1, 1.5 and 2 mg/l) of 2,4-D, Kin and NAA. The results showed that the highest percentage of callus formation (98%) was observed on root explants in MS medium supplemented with 1 and 1.5 mg/l of 2,4-D and Kin respectively. Also maximum percentage of callus formation (97%) was observed at 1.5 mg/l of NAA and Kin treatment of root explants. Silymarin measurement showed that the maximum percentage of silymarin (14.44%) was observed at 1 and 1.5 mg/l of 2,4-D and Kin in callus from root explants. Meanwhile the highest percentage of silymarin (9/8%) was achieved at 1.5 & 1 mg/l NAA and Kin in callus from root explants. These results indicating that root is the best explants to produce callus and silymarin in tissue culture system.

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STUDY OF EFFICACY OF *STACHYS LAVANDULIFOLIA* AERIAL PARTS IN TREATING THE CLINICAL SIGNS OF ABNORMAL UTERINE BLEEDINGS DUE TO POLYCYSTIC OVARIAN SYNDROME

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Polycystic ovarian syndrome (PCOS) is a complex endocrine and metabolic disorder in women. This disorder has been found in 6-8% of women of reproductive age. The important clinical signs of this syndrome include acne, hirsutism, alopecia, irregular menstruation, amenorrhea, obesity and infertility. Various treatment methods have been introduced to control and treat signs of this syndrome. In this study, effects of medroxyprogesterone and *Stachys lavandulifolia* aerial parts in treating the clinical signs of abnormal uterine bleedings due to PCOS have been compared. Total amount of flavonoids in the plant is measured by the aluminum chloride colorimetric method. In this clinical trial, 66 patients with polycystic ovarian syndrome were classified randomly and voluntarily with respect to age, height and weight similarities. 33 patients of the first group received 10mg medroxyprogesterone in 10 continuous nights per month for 3 successive months. To 33 patients of the second group were administered an infusion from 5g *S. lavandulifolia* aerial parts three times a day for 3 successive months. The clinical signs of abnormal uterine bleedings of patients in both groups before and after treatment were collected in a particular questionnaire. Finally data obtained from the questionnaires were analyzed by Levene's test, Chi-Square test, McNemar test and Independent t-test. Average of age and body mass index in both groups of patients treated by either medroxyprogesterone or *S. lavandulifolia* aerial parts showed no significant difference. Also it was observed that after treatment, there was no a significant difference between the two groups in improvement of clinical signs for menorrhagia, hypermenorrhagia, menometrorrhagia, metrorrhagia, polymenorrhagia and amenorrhea ($p>0.05$). Although there was a remarkable difference between the two groups in improvement of oligomenorrhagia clinical sign. Since there is no significant difference between two groups of patients who received medroxyprogesterone and *S. lavandulifolia* in improvement of clinical signs related to abnormal uterine bleedings, *S. lavandulifolia* can be used as an alternative natural drug for medroxyprogesterone in treating abnormal uterine bleedings due to polycystic ovarian syndrome. Although medroxyprogesterone is a more effective drug in improvement of oligomenorrhagia clinical sign. It should be noted that *S. lavandulifolia* has less side effects compared to medroxyprogesterone (though not meaningful).



EFFECT OF NANO IRON CHELATE FERTILIZER ON YIELD AND YIELD COMPONENTS OF CUMIN (*CUMINUM CYMINUM*) UNDER DIFFERENT IRRIGATION INTERVALS

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Cumin (*Cuminum cyminum*) is one of the most important medicinal plants of India, Iran and other countries and due to its specific ecological requirements it is grown only in a limited area of these countries (1). To study the effect of levels of Nano chelate Iron fertilizer on yield and yield components of cultivars under different irrigation in 2011 growing season at the Research Farm Faculty of Agriculture, University of Shahed, as split-plot factorial experiment according to randomized complete block design with three replication. Main plots were 7, 9 and 11 days irrigation intervals. Subplots were India, Isfahan, Kashmar populations and iron chelate Nano fertilizer (khazra) applied. With amounts of 3 and 6 kg/ha and the controls. Results showed that the number of subsidiary umbrellas per plant, number of seed per umbrella, and thousand seed weight affect the interaction of irrigation and fertilizer levels was significant statistically ($p < 0.01$). Most number of subsidiary umbrellas related to irrigation interval 11 day treatment with applied 3 kg/ha Nano fertilizer. Irrigation interval 11 day treatments with applied 6 kg/h Nano fertilizer was highest thousand seed weight. Maximum number of seed per umbrella was for the irrigation interval 7 day treatments with applied 6 kg/h Nano fertilizer. Also the interaction of Nano fertilizer levels and populations was significant statistically ($p < 0.05$) at the number of subsidiary umbrellas per plant and interaction of irrigation and population for number of seed per umbrella. The results showed that interaction between parameters like irrigation interval, nano fertilizer levels and population for yield per plant, biological yield and number of main umbrellas per plant was significant. The highest yield per plant, biological yield and number of main umbrellas per plant was with 6 kg/h nano-fertilizer utilization under irrigation interval 7 days. The results of this study appear to be under irrigation limited resources, 6 kg/h iron nano-fertilizer application, accept the unacceptable loss in performance, using irrigation to other essential allocated.

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COMPARATIVE ANATOMY OF STEM IN SOME SPECIES OF THE GENUS *TRIPLEUROSPERMUM* IN IRAN

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The genus *Tripleurospermum* Sch. Bip. belongs to the tribe Anthemideae of the Asteraceae family, and comprises about 38 species in the world which are distributed in temperate regions of the northern hemisphere. This genus is represented in Iran by seven species [1]. *T. disciforme* is one of the indigenous medicinal plants that is useful for gastric ulcer [2]. Taxonomic identification of some species because of their morphological variation is controversial. So, in this research we attempted to study stem anatomical features to find new characters to differentiate taxa. In this study we have found that in all species schloranshyma bundles are located above phloem bundles, and they have joined bundle sheaths (xylem & phloem), and inner bundles phloem, and existence of secretory channels. Some characters were different between the species such as variation of hair shapes (such as existence multicellular hair in *T. parviflorum* and secretory hair in *T. caucasicum* and there is no hair in *T. disciforme*), and the number of epidermis layer (presence of two layers of the epidermis in *T. transcaucasicum*). Therefore we could distinguish the species by using anatomical characters.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE STUDY OF DISTRIBUTION AND ECOLOGY OF MEDICINAL SPECIES FROM LABIATAE (LAMIACEAE) FAMILY IN BOSHEHR PROVINCE

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In this research 12 medicinal plant species from Labiatae family have been collected and studied from different areas in the elevation above sea level to 1620 in Boshehr province. The investigated factors include slope percent, aspect, altitude, the distribution, soil texture, climate, the average annual rainfall, the annual temperature, coverage percent and distribution of plants. The results have been shown that some species in this research are the symbol of particular environmental condition and they are growing in particular areas in the Boshehr province. Also the results have been shown that the collected species are in 5 genera. The most common species are from *Salvia* with 6 species and after that in order genus of *Mentha*, *Teucrium*, *Nepeta* and *Otostegia*. The distribution of *Salvia* are in wide range from the elevation 15 meters above the sea level to 1169. The most distribution in this species related to *Salvia macrosiphon*. The growth location in *Mentha* and *Nepeta* are the reagent of around stream and humid mountain areas and the most distribution are in 1620 elevation meters above the sea level. The *Teucrium orientale* was collected from the areas which had 10- 893 meters elevation and pasture and arable landscape in Dashtestan, Tangestan, Genaveh and Boshehr. However the *Teucrium polium* was collected from the areas which had 29-1055 meters height above the sea level and pasture and mountain scenery in Genaveh. The *Otostegia persica* was collected from the areas with 260-290 elevation above the sea level.

FORMULATION AND EVALUATION OF MICROEMULSIONS FOR TRANSDERMAL DELIVERY OF N-HEXANE EXTRACT OF *ONOSMA CHLOROTRICUM* PLANT

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Microemulsions are thermodynamically stable, isotropic mixtures of oil, water and surfactant, frequently in combination with a co-surfactant. Up to date microemulsions have been shown to be able to protect labile drug and herbal extracts, control drug release. Recent interest in microemulsion systems has resulted from their utility in a broad range of applications including transdermal delivery. *Onosma chlorotricum* is belonging to Boraginaceae family that its root extract is used for wound healing treatment. The aim of this study is to develop and prepare microemulsion formulation from n-hexane root extract of this plant. N-hexane root extract of plant prepared with Soxhlet method. Microemulsion regions obtained from Oleic acid- Transcutol P (10:1), Tween 80- Span 20, Propylene glycol (3:1) and water. Then, four formulations selected with factorial design (2²), and 0.2% extract is added to these formulations. All samples examined for pH, RI, droplet particle size, DSC, SEM, viscosity and stability. The result shows that the mean droplet size was in the 18.4-64.9 nm range. pH and RI values were 4.73-5.82, 1.4542-1.4592 respectively. The viscosity range was 182- and Cubic liquid crystals. However, the results imply that by selecting proper materials and ratios a microemulsion system may be used as nano-vehicle for root plant extract that improves skin penetration.

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THE SURVEY OF SOWING DENSITY ON YIELD AND LEVEL OF ESSENTIAL OIL OF *THYMUS DAENENSIS* CLAEK. IN DIFFERENT CUTTING IN KERMAN.

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Thymus daenensis ClaeK. is a woody and perennial plant from Labiatae family which has extended uses in different drug industries and, nowadays, is plants in extensive areas of farms, this study was done to evaluate the effect of different harvests and density on yield and essential oil of *Thymus daenensis* ClaeK. in the shape of randomized complete block design and 4 replicates the treatments include the date of harvest, the first harvest in July and the second harvest in August, and the density of plant in four level (8.3, 11.1, 16.6, 33.3, plant/m²) variance analysis of characters was done by Duncan's multiple range test. From agricultural characters were noted the height of plant, cover crown, dry and wet weight yield, economic yield, essential oil yield and percentages the results showed that the effect of density, dry and wet weight yield, economic and essential oil yield was significant in the level of 1% the yield increased as the number of plant increased. The most economic yield was observed from 333000 Plant/ha, 2474kg. With the increase in density by a factor of four, the increase of 78.3% was observed. Also the date of harvest was significant on economic yield, essential oil percentage, dry and wet weight yield, plant's wet and dry weight, and cover crown. The most economic yield and essential oil percentage from the first harvest was 1603 kg/ha and 1097%, respectively considering the obtained results from noted characters, it had been revealed that in the first year, the most appropriate density of *Thymus daenensis* ClaeK. is 333000 plant/ha and the sum yield of two harvest is 4948 kg.

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EFFECT OF ETHANOLIC EXTRACT OF *CUCUMIS MELO L.* SEEDS ON PREVENTION OF CALCIUM OXALATE CRYSTALLIZATION IN URINE *IN VITRO*

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Urolithiasis is a worldwide problem, sparing no geographical, cultural, or racial groups. Kidney stones are composed of inorganic and organic crystals amalgamated with proteins. Crystallisation and subsequent lithogenesis can happen with many solutes in the urine. Calcareous stones are still by far the most common nephroliths accounting for more than 80% of stones. In Iranian folk medicine, many plants are used for treatment of kidney stones. In the present study, effect of *Cucumis melo L.* seeds ethanolic extract on calcium oxalate crystallization in vitro was studied. At first, ethanolic extract of plant were prepared. Calcium oxalate crystallization was induced by adding sodium oxalate to urine samples of 12 men. Calcium oxalate crystallization in absence or presence of plant extract was compared. Results showed that the plant increased number of crystals in comparison to control samples. On the other hand, the plants increased small crystals, while decreased big crystals in experimental samples. Also, the plant increased mono hydrate calcium oxalate crystals in comparison to di hydrate calcium oxalate crystals. So, *Cucumis melo* seeds are a good candidate for prevention of calcium oxalate crystallization.

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COMPARING MEDICINAL PLANTS EXTRACT AND PULSING TREATMENTS ON ROSE CUT FLOWERS "DOLCE VITA" PETAL ABSCISSION

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The effect of (4% calcium chloride + 3% sucrose and deionised water) pulsing for 24 hours combined with medicinal plants extract (*Stevia rebaudiana*, *Thymus vulgaris*) was evaluated on vase life of Cut Rose Flowers "Dolce Vita". A completely randomized design with three replications was used in this survey. Effect of Thyme (0.1, 0.2 ppm) and Stevia (0.1, 0.2 ppm, 1, 2g/l) treatments combined with pulsing (two types) treatments was carried out on petal abscission along flowers postharvest vase life. Pulsing (4% calcium chloride + 3% sucrose) improved vase life, compared with deionised water pulsing. Medicinal plants extract levels comparing, resulted that, *Thymus vulgaris*, *Stevia rebaudiana* (0.1 ppm) had most effect on petal abscission, while *Stevia rebaudiana* (1 g/l) inhibited petal abscission and as an important this experiment goal, these are the best treatment levels.



ASSESSMENT OF GENOMIC DIVERSITY AMONG AND WITHIN IRANIAN CASTOR BEAN (*RICINUS COMMUNIS* L.) POPULATIONS BY USING INTER SIMPLE SEQUENCE REPEAT (ISSR) MARKERS

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Castor bean (*Ricinus communis* L.) is an important non-edible oilseed crop. The plant is extensively grown in the tropical and subtropical regions of world. It has a diploid genome with 20 chromosome pairs and a genome size of 350 Mb. The seeds contain oil (40–60%), which is rich ricinoleic acid (80–90%). Ricinoleic acid inhibits the growth of many bacteria, viruses, molds and yeasts. Castor oil has multiple uses including medicinal, as an ingredient in shampoo, soap, hand lotion, high-speed lubricant and as a coating material. In the present work, inter-simple sequence repeats (ISSR) markers was used to assess the genetic diversity of 60 individuals belonging to 12 castor bean accessions from different regions of Iran. Out of 32 ISSR primers tested, 16 primers showed high polymorphism. Totality, 282 bands were detected which of them 166 bands were polymorphic, ranging from 230 to 2800bp in size. The polymorphism rate ranged from 33.3% (UBC 822) to 100% (UBC 859), with an average of 69.8%. Based on an un-weighted pair-group method using arithmetic average (UPGMA) clustering algorithm, 12 castor bean accessions were clustered into four distinct groups. Group I included 4 accessions belonging to Markazi and Isfahan provinces. Group II comprised of 3 accessions, from Markazi, Yazd and Isfahan provinces. Group III contained of 3 accessions from Markazi, Fars and Isfahan provinces. Group IV consisted of 2 accessions from Hamadan, Kerman provinces. It was obvious that the genetic relationships among the studied landraces did not have forced tendencies to associate with their geographic origins. Therefore, the selection of parental material for hybridisation in breeding programs that is simply based on geographic diversity may not be useful. Analysis of molecular variance revealed lower genetic variation among accessions (18%), than within accessions (82%). In conclusion, our results revealed that ISSR markers are effective tools to evaluate genetic relationships in castor bean. The highest genetic diversity observed within castor bean accessions from different origins show the importance of genetic source preservation and possibility of selection of superior genotypes among accessions.

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PATH COEFFICIENT ANALYSIS OF YIELD AND RELATED TRAITS IN CASTOR BEAN (*RICINUS COMMUNIS* L.)

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Castor bean (*Ricinus communis* L.), a monotypic species, is an important non-edible oilseed crop. The seeds of castor bean contain more than 45% oil, which are primarily used in industry (aviation oil, nylon and waxes), farming (as a source of high-nitrogen fertilizer) and medicine (as a purgative and treatment of skin infections). Seed yield is a quantitative trait and highly affected by environmental factors and hence has a low heritability and commonly plant breeders prefer yield related traits that indirectly increase yield. Definition of correlation and path coefficients between yield and related traits are important for the selection of favourable plant types in castor bean breeding programs. In this research the genetic diversity of 12 castor bean (*Ricinus communis* L.) accessions collected from different origins of Iran including, Markazi, Isfahan, Hamadan, Kerman, Fars and Yazd. Accessions was assessed under filed conditions, which were evaluated in a randomized complete block design with three blocks. The data on 5 individuals in each block were recorded for 32 agro-morphological traits. The correlation coefficients among 32 studied traits were calculated. A strongly positive correlation was observed between total seed primary raceme weight and seed number on primary raceme ($r=88$). Also, this trait exhibited significant positive correlation with female flower length, primary raceme length and main stem diameter traits. In this study we considered the total seed weight on primary raceme as yield trait. Path coefficient analysis indicates high direct positive effect of seed number on primary raceme (0.82) and 10 seed weight on primary raceme (0.36) on seed yield. In addition, the direct effect of primary raceme length on seed yield was negative (-0.13), while it had high positive correlation (0.62) with seed yield. Primary raceme length had the greatest indirect effect via seed number on seed yield (0.35). Based on our results, in selecting high yielding genotypes, the major attention should be focused on the seed number on primary raceme. To a lesser order, the 10 seeds weight on primary raceme may also be introduced.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF DIFFERENT HORMONAL COMBINATIONS AND CONCENTRATION ON DIRECT SHOOT REGENERATION FROM SHOOT TIP EXPLANTS OF *CARUM COPTICUM* L.

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The ajowain (*Carum copticum* L.) is an aromatic, grassy, annual plant, belonging to umbelliferae family which grows in the east of India, Pakistan, Iran and Egypt [1]. Thymol, the major phenolic compound that present in Ajowan, has been reported to be a germicide, antispasmodic, and antifungal agent [2]. The effect of different auxin and cytokinin hormones combination and concentrations on direct shoot regeneration in shoot tip explants of *C. copticum* were studied. All explants were cultured on MS basal medium supplemented with 16 different combination of BAP (0, 2.2, 4.4, 8.8 μ M) and IAA (0, 0.5, 1.1, 2.2 μ M). Analysis of variance showed significant difference between treatments ($p \leq 0.05$). Highest regeneration frequency (% 35.24) of shoot induction was obtained on media supplemented with 4.4 μ M BAP and 0.5 μ M IAA and the lowest regeneration frequency (1) in control treatments (free of growth regulators). The maximum number of regenerated shoots (34) observed on media supplemented with 4.4 μ M BAP and 0.5 μ M IAA and minimum number of regenerated shoots (1) observed on control media.

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COMPARISON OF ANTHOCYANINS IN FOUR SPECIES OF MEDICINAL PLANTS

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Anthocyanins (also anthocyanins; from Greek: $\acute{\alpha}\nu\theta\acute{\omicron}\varsigma$ (*anthos*) = flower + $\kappa\upsilon\alpha\nu\acute{\omicron}\varsigma$ (*kyanos*) = blue) are water-soluble vacuolar pigments that may appear red, purple, or blue according to the pH. They belong to a parent class of molecules called flavonoids synthesized via the phenylpropanoid pathway; they are odorless and nearly flavorless, contributing to taste as a moderately astringent sensation. Anthocyanins occur in all tissues of higher plants, including leaves, stems, roots, flowers, and fruits. Anthoxanthins are their clear, white to yellow counterparts occurring in plants. Anthocyanins are derivatives of anthocyanidins, which include pendant sugars. Cancer research on anthocyanins is the most advanced, where black raspberry (*Rubus occidentalis* L.) preparations were first used to inhibit chemically induced cancer of the rat esophagus by 30-60% and of the colon by up to 80%. Effective at both the initiation and promotion/progression stages of tumor development, black raspberries are a practical research tool and a promising therapeutic source, as they contain the richest contents of anthocyanins among native North American *Rubus* berries. First essential oil of chamomile, *avena sativa*, valerian and licorice extracted with Soxhlet. Then measure the amount of anthocyanins was performed using spectrophotometry techniques. The amount of anthocyanins present in the chamomile (0.82) is almost two times the amount of this substance in the *avena sativa* (0.52) and four times the amount of valerian (0.21) and licorice (0.20).

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16, 17 May 2012
Kish Island



EFFECT OF SOWING DATE AND PLANT DENSITY ON YIELD OF CHICORY (*CICHORIUM INTYBUS L.*)

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To evaluate the effect of sowing date and plant density on yield (root, shoot and flower) and morphological characteristics of chicory, an experiment was conducted at Research Station, Agricultural Researches Centre of Yazd, in growing season of 2010. The experimental design split-plot in the basic of randomized complete blocks with three replications was used. Main plots consisted of three sowing dates (6/March, 4/April and 5/May 2010) and sub-plots included three density levels (5, 7 and 10 plant/m²). The results showed that plant density had significant effect on measured traits. With increasing plant density, biological yield significantly increased. 10 plant/m² had maximum yield in fresh and dry shoot weight and fresh and dry root weight. Sowing date had significant effects on measured traits except fresh and dry shoot weight. First date produced the highest fresh and dry shoot weight (11725 and 3209 kg/ha) and dry flower weight (67 kg/ha). Second date produced the highest fresh and dry root weight (1548.3 and 536.2 kg/ha). Third date not produced stem. The maximum dry root and shoot weight in chicory were obtained at the second sowing date with 10 plant/m² density.

ANALYSIS OF THE VOLATILE COMPOUNDS AND ESTIMATION OF TOTAL PHENOLIC CONTENTS, ANTIOXIDANT AND ANTIMICROBIAL ACTIVITY OF STEM AND FRUIT OF *MINDIUM LAEVIGATUM* (VENT.) RECH.F. & SCHIMAN-CZEIKA FROM KASHAN

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Genus *Mindium* (family *campanulaceae*) has three species in Iran and 7 in the world [1,2]. In the warm season of 2011 *Mindium laevigatum* was collected from northwest of Kashan (Rahagh). Volatile constituents of the plant extracted through SDE apparatus were analyzed both qualitatively and quantitatively using gas chromatography-mass spectroscopy technique [3]. The main volatile components of the stem and fruit were palmitic acid, methyl palmitate, pelargonic acid, p-vinyl guaiacol, perhydrofarnesyl aceton, heneicosane, pentacosane. *In vitro* antioxidant and antimicrobial potentials of the stem and fruit extracts of the plant were also evaluated and IC₅₀ values of 1.05 and 0.56 mg/ml were recorded in 2,2-diphenyl-1-picrylhydrazil (DPPH) test and inhibition percentages equal to 16.3% and 37.4% were obtained in β -carotene/linoleic acid assay respectively. Small total phenolic compounds content (27.19 and 44.66 μ g/mg, respectively) were detected for methanol extracts of stem and fruit as gallic acid equivalent in the Folin-Ciocalteu test [4]. Determination of antimicrobial activities of *M. laevigatum* extracts were accomplished by agar disk diffusion method and micro-well dilution assays .

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



FLAVONOIDS AND ANTIOXIDATIVE ENZYMES ALLEVIATE OXIDATIVE DAMAGE OF
PHLOMIS TUBEROSA IN NATURAL HABITATS

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Plants are known to react to UV radiation by radical scavenging and pigmentation (Jacobs et al. 2007). In the previous work, we have found that antioxidant defense system was obviously inefficient in the protection of *Phlomis tuberosa* against UV radiation (Habibi et al. 2010). In this work, we studied the different physiological parameters such as total flavonoid content, leaf thickness, leaf relative water content (RWC) and some antioxidative enzyme activities (Habibi and Hajiboland 2011) in sun and shade leaves of *P. tuberosa* growing at 800 and 1800 m, and the role of these parameters as protection mechanisms in an altitudinal gradient of increasing UV radiation in Mishou-Dagh, near the town of Payam, NW Iran. In both altitudes sun leaves presented higher concentrations of total flavonoid than shade leaves. Sun leaves of higher location presented flavonoid concentrations two times higher than those of lower location. The content of total flavonoid pigments was 18% higher in shade leaves of *P. tuberosa* at 1800 m than in those from 800 m altitude. Relative leaf water content was not larger in plants of higher location than in those of lower location. Leaf thickness in sun and shade leaves was significantly higher in the higher location. In both sites, the activities of superoxide dismutase (SOD), catalase (CAT) and peroxidase (POD) showed no significant difference between sun and shade leaves. Sun leaves presented larger malondialdehyde (MDA) content than shade leaves. Activity of CAT was 32% higher in *P. tuberosa* leaves at 1800 m than in those from 800 m altitude, whereas the activities of SOD and POD in the region 800 m were not significantly different from 800 m altitude. UV absorption and linked morphological traits (leaf thickness) presented the larger differences among studied plants at different altitudes and seem to be the dominant UV protecting mechanisms. In addition to epidermal screening of potentially damaging UV radiation, flavonoids may also contribute to UV protection by scavenging of AOS. However, the role that flavonoids play in protection against AOS damage has not been properly documented.

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EVALUATION OF PUBLIC AND TECHNICAL KNOWLEDGE OF MEDICINAL PLANT SELLERS
IN ISFAHAN PROVINCE

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Now a day, because of unsuitable effects of synthetic drugs, utilization of medicinal plants is widespread. Developing demand of these materials has been resulted in increasing medicinal plant shops. As, these shops deal with public health, it is necessary that their seller have enough ability and knowledge both in public and technical. Unfortunately, there isn't data never about the number of shops nor their sellers. Therefore, an experimental study for future planning was designed. The study was accomplished in up to 170 shops in 31 cities in Isfahan province. Query forms were designed and filled as face to face with sellers. Results showed that about 30 percent of the sellers had no knowledge or very little. About 50 percent of them had high school diploma and 22 percent had higher education certificates. About 10 percent of them had, only, certificates in agriculture fields. Results, also, showed that technical knowledge of them were very low. Totally, results showed that not only public but also technical knowledge of medicinal plant sellers was not sufficient for their works. Thus, it is necessary to attempt in improving of knowledge among these peoples. Finally, several recommendations had been presented.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



CALLUS AND CELL CULTURE OF *SCROPHULARIA STRIATA* FOR ACETOSIDE PRODUCTION

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Scrophularia striata Boiss. (scrophulariaceae), is one of the native traditional medicinal plants in Iran which contains Acteoside. Acteoside is a phenylethanoid glycoside belonging to water soluble polyphenolic compounds. It consist of several chemical groups including; caffeic acid, 3, 4 dihydroxyphenylethanol, glucose and rhamnose and has pharmacological significance for its anticancer, antimetastatic, hepatoprotective, anti-inflammatory, antinociceptive and antioxidant activities. Due to the very restricted supply of acteoside from nature, plant cell cultures have been recognized as a potential option for large scale production of acteoside. In this study leaf and hypocotyle explants, were used for callus induction on Murashige and Skooge medium supplemented with 3% (w/v) sucrose, NAA (0, 0.25, 0.5, 2, 4 mg/L), BA (0, 0.25, 0.5, 2 mg/L) solidified with 7 g /L agar, pH: 5.8. They were incubated in darkness at 25^{0C}. After 7 days the calli were emerged and subcultured every 2 weeks. The results showed the highest callus induction in MS medium supplemented with 3% (w/v) sucrose, 0.5 mg/ L NAA, 2 mg/L BA. In addition, we found acteoside is produced in cell cultures of *S. striata* Boiss and it detected by HPLC method. In conclusion, cell culture could be considered as an alternative source to produce this important phenylethanoid glycoside from *S. striata*.

GERMINATION RESPONSE OF TWO MEDICINAL PLANTS (*CICHORIUM INTYBUS* L. AND *PIMPINELLA ANISUM* L.) TO WATER STRESS INDUCED BY POLYETHYLENE GLYCOL

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Seed germination is an essential process in plant development to obtain optimal seedling numbers that results in higher seed yield. Germination and seedling growth declined with many abiotic factors such as salt and drought stress that are the most important abiotic stresses. In order to study the germination response of two medicinal plants (*Cichorium intybus* L. and *Pimpinella anisum* L.) seeds, to water stress (water stress induced by polyethylene glycol), an experiment was carried out in physiology laboratory of University of Zanjan in autumn 2011. The experimental design was a factorial based on completely randomized design with three replications. In this experiment, the effect of water stress induced by osmotic solutions of polyethylene glycol 6000 in five levels including 0, -3, -6, -9 and -12 bars on two medicinal plants (anise and chicory) were investigated. The results showed that the effect of species, osmotic potential and interactions of species and osmotic potential on majority of measured traits were significant ($p \leq 0.05$). Germination percentage, germination rate, germination index, vigor index, radicle and plumule length and seedling fresh and dry weight in both species decreased with decrement in osmotic potential from 0 to -12 bars. Both species had different response to water stress. Water stress had more inhibitory effects on germination rate and percentage of anise which indicate the higher sensitivity of anise compared with chicory to water stress. Therefore in regions which suffer from a water deficiency, production of chicory will be more relevant than anise.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



INHIBITORY EFFECTS OF *KELUSSIA ODORATISSIMA* MOZAFF. ON α -AMYLASE AND α -GLUCOSIDASE, ENZYMES ENROLLING IN POST-PRANDIAL HYPERGLYCEMIA

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Diabetes mellitus is the most common metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbance of carbohydrate, fat and protein metabolism, resulting from defects in insulin secretion, insulin action or both. According to WHO, the prevalence of the disease will grow from 171 million in 2000 to 336 million people affected in 2030, which amount to an increase of 144% over the next 30 year. About 4 million people suffer from diabetes in Iran and 0.4 million people are exposed to it. α -amylase and α -glucosidase are key enzymes in metabolic pathways such as starch breakdown and intestinal absorption so they are used as one of therapeutic approach for the management of hyperglycemia linked to type 2 diabetes (like miglitol, voglibose and acarbose). *Kelussia* is one of the newest genera of the Umbelliferae and is represented by only one species, *Kelussia odoratissima* Mozaff., which found only in Iran and locally called "Karafs-e-koochi". The aerial part of the plant is commonly used as a popular garnish and some medicinal uses. In this study, different medicinal plants used for glucose lowering effects in traditional and folk medicine have been studied. As a part of this investigation, the inhibitory effects of hydroalcoholic extract of *Kelussia odoratissima* was investigated, using in vitro model. Acarbose was used as positive control. The inhibitory activities were presented as IC₅₀ value and calculated 22.5 ± 0.3 and 12.3 ± 0.4 mg/ml for α -amylase and α -glucosidase inhibitory effects respectively and for acarbose were 0.05 and 0.03 mg/ml respectively.

EVALUATION OF NARINGIN AND HESPERIDIN CONTENTS IN LEAVES OF TWO CITRUS CULTIVARS

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Naringin and Hesperidin are two of abundant flavonoid secondary metabolites in citrus, which are important in the pharmaceutical industry. The aim of this study was two investigate hesperidin and naringin contents of two citrus cultivars, Limogolaby Amol (branch mutation) and Shole mahalle (natural hybrid). This investigation was carried out in a completely randomized block design with three replicates at the Citrus Research Institute of Tonekabon (Kotra) and Gorgan Agricultural Sciences and Natural Resources University. The variables measured included fresh and dry weight of leaves, the total phenol and Naringin and Hesperidin in the total extract. Extraction of total extract was conducted by hexan and measurement of naringin and hesperidin content recorded by High Performance Liquid Chromatography (HPLC). Results showed no significant difference in hesperidin, fresh and dry weight of leaves and total phenol contents of levels between evaluated citrus cultivars. While, a significant difference observed between two cultivars regarding naringin ($p < 0.1$). As the highest naringin content (0.88%) obtained in Limogolaby Amol cultivar.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ANTIBACTERIAL EFFECT OF SOME ANABAENA SPECIES AGAINST SEVERAL BACTERIA

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In the present study, antibacterial effects of 13 population of 6 *Anabaena* sp. (*Anabaena variabilis*, *Anabaena vaginicola*, *Anabaena torulosa*, *Anabaena sphaerica*, *Anabaena ambigua*, *Anabaena oscillarioides*) was conducted. The main objective of this study was to look for active substance that could be used as antimicrobial agents. Therefore *Anabaena* species was isolated from 6 regions in the Iran. Specimens of Alga, than, was cultured in BGo-11 medium. After suitable growth, several different solvents were used for extraction of the bioactive compounds of the cyanobacterial species. All bacterial strains were maintained on nutrient agar media. Syanobacterial extracts effect was performed on 5 gram positive bacteria (*Bacillus subtilis*, *B. pumulis*, *Enterococcus faecalis*, *Staphylococcus aureus*, *S. epidermidis*) and 3 gram negative bacteria (*Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*) at the *in vitro* condition. The Results obtained in the present investigation showed that *anabaena* species can be a potential source of antibacterial agents.

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COMPARATIVE EXAMINATION OF CHEMICAL COMPOSITIONS OF THE ESSENTIAL OIL OF *TEUCRIUM POLIUM* IN IRAN, JORDAN, ITALY, FRANCE, GREECE AND SARDINIA ISLAND

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This study was designed to compare the chemical composition of essential oil of *Teucrium polium* (Labiatae) in Iran-Kerman, Jordan, Greece, Italy, France and Sardinia island. The main constituents of the essential oil were Germacrene D, β -Caryophyllene, α -Pinene and Caryophyllen oxide. *Teucrium polium* is used as anti-inflammatory, antibacterial, anti-rheumatic activities. This reduces the blood glucose concentration due to increased peripheral glucose metabolism than secretion insulin. There are many free radicals in the body (including the superoxide anion, hydroxide anion, etc.) that disrupt the fluidity of membrane changing the nature of protein and oxidize DNA. *Teucrium polium* can be used as a natural anti-oxidant. *Teucrium polium* was extracted in Kerman by Cleverger then the main components of the extracts were determined by using GC-MS and GC-FID. The major components were α -Pinene (12.52%), Germacrene D (3.1%), Caryophyllen oxide (9.69%) and Linalool (10.63%). Component of this oil in Jordan contains: Caryophyllen oxide (3.25%) and Germacrene D (4.10%); in Greece: α -Pinene (4.5%), Caryophyllen oxide (7.9%), Linalool (3.4%) and β -Caryophyllen (12.2%); in Italy: α -Pinene(4.5%), Germacrene D (3.11%) and β -Caryophyllen (5.1%); in France: α -Pinene (28.8%), β -Pinene (7.2%) and in Sardinia island: Caryophyllen oxide (3.2%), α -Caryophyllen (7.18%) and Iso-Caryophyllen (20.24). The percentage of effective components in *Teucrium polium*, varies according to climate in each region [1-6].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF DROUGHT STRESS TREATMENTS ON THE PRODUCTION AND SEED QUALITY TRAITS IN THREE ECOTYPE PURPLE BASIL (*OCIMUM BASILICUM* VAR. PURPLE)

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To investigate the effect of drought stress on some morphological traits and yield of three populations of Purple Basil (*Ocimum basilicum* var. purple), an experiment was performed in the Alborz Karaj research station, in 2011, as a split plot randomized complete block design with three replications. Main factors include population from Karaj, Isfahan and Shushtar, sub-factor were different levels of drought stress include 90%, 60%, 30% field capacity, which those applied during the period of plant growth (from the seedling to the seed loss). Analysis of variance showed that among different populations in yield of , inflorescence, germination percentage and uniformity of germination, There was no significant difference. Grain weight was significant at 1% level. Variance at different levels of drought stress was significant on flowering, seed weight and uniform germination at 1% and germination percentage in 5% level. Comparison of main factor showed that the highest seed weight (1 / 71 g) in Karaj population and the lowest yield (1 / 43 g) was found in Shushtar population. Comparison of secondary factor showed that most yield of inflorescence (3 / 55 ton/ha), seed weight (1 / 65 g), germination percentage (93/55 %), uniformity of germination (0 / 016 %) was significant in 90% Fc. Comparison of drought stress showed that minimum yield of inflorescence (1 / 81 ton/ ha), seed weight (1 / 43 g) , germination percentage (88 / 44 %), uniformity of germination (0 / 013 %) was significant in 30% Fc. In this study, the highest yield of inflorescence was obtained in Isfahan population * 90% Fc. The results showed maximum seed weight and germination percentage was in Karaj population * 90% Fc.

THE COMPARISON OF SEED YIELD AND ITS CONTRIBUTING TRAITS IN 81 SESAME (*SESAMUM INDICUM* L.) GENOTYPES

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Sesame (*Sesamum indicum* L.) has been cultivated and consumed in Asia since ancient times. Nowadays, the increasing knowledge on dietary and health benefits of it has increased the universal demand for its seed and oil [1]. This research was performed to study the genetic diversity in sesame (*Sesamum indicum* L.) using agronomical descriptors aiming to identify the best sesame lines and hybrids for increasing the seed yield. Nine sesame genotypes including five Iranian breeding lines and four Asian genotypes along with their 72 F₁s with reciprocals were grown in a randomized compelled block design with three replications during 2008 in Agricultural farm, Isfahan University of Technology. Data were collected on seed yield and it's the most important components, including number of capsules/plant, 1000 seed weight and number of seeds/capsules. Analysis of variance and mean comparisons were performed using General Linear Model of SAS computer program. The results showed high significant differences among the genotypes for all traits studied. Among the parents, 1000 seed weight varied from 2.82 to 3.7 g. Number of Capsules/plant, seeds/Capsule and seed yield/plant showed a range of 32.1 to 72.6, 48.4 to 88.3 and 5.5 to 14.2 g, respectively. Yekta followed by Varamin 2822, both from Iran, with 3716.5 and 3564.4 kg ha⁻¹, respectively, had considerably higher seed yields than the other parents, but the lowest mean of seed yield (1450.9 kg ha⁻¹) was observed in early maturing parent from Mediterranean region. Among the F₁ hybrids, the cross of two local genotypes, Darab1 as a male parent with Varamin2822 as female, with 4442 kg ha⁻¹ displayed a far better performance than the others. The overall results indicated that, Yekta and Varamin2822 were superior contributing lines to produce high seed yield, and maximum number of capsules/plant and seeds/capsule of hybrids. So, these parents can be used in recombination breeding programs to accumulate their favorable genes responsible for improving seed yield in promising pure lines.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF OSMO-DEHYDROFREEZING PROCESS ON TEXTURE AND COLOR OF PLUMS SAMPLES

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Osmo-dehydrofreezing is a combined process consisting of osmotic dehydration followed by air dehydration and then freezing. Today's production of various products with high nutritional quality is very important. Purpose of This study is the production of products with high nutritional and shelf life properties. In this study plums samples after peeling were dipped in solutions contain of sucrose, ascorbic acid and citric acid with different percentage. Then the moisture was reduced under 65°C hot air up to 38%. The samples immediately were frozen after cooling in 4-5°C and stored in -20°C. Color tests using image processing software and texture properties using texture analyzer machine were done on freeze samples after two months. Statistical analysis of data was done in randomized plan ($p < 0.05$) and showed that treatment contains 1% (w/v) ascorbic acid and 45% (w/v) of sucrose had the best color and texture even after 2 month.

INDUCTION OF CALLUS CULTURE OF *APIUM GRAVEOLENS* L., A MEDICINAL PLANT

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Apium graveolens L. (Apiaceae) is a biennial herb distributed in throughout the world from north America to Africa, Europe and Asia. The plant was cultivated from ancient time as a vegetable and due to different biological activities, is regarded as a medicinal herb. The plant is known as a good source for biosynthesis of coumarins and furanocoumarins, potent pharmacologically active natural products. In order to study the possibility of coumarins isolation from callus tissue, in the present work, we study on induction of callus tissue from plant seedling [1]. Seeds of *A. graveolens* (certain population) were surface sterilized with sodium hypochloride (1%) and ethanol and then put in sterile Petri dishes (90mm) lined with one sterile filter paper (Whatman, number 2). After seeds germination and seedlings emergence, seedlings were transfer to solid MS medium containing different concentration of phytohormones 2,4-D and kinetin (0,0 ; 2,1; 3,1, 4,2 mg/L) in various petri dishes. The petridishes were kept in a growth chamber with 12-12 h dark-light regime at 25°C [2]. The results indicated that although callus induction take place in MS medium without phyto hormones, callus growth was increased in the presence of 2,4-D and kinetin. The high amount of callus production was observed in medium with 2, 4-D (4 mg/L) and kinetin (2mg/L).

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ANTIDIABETIC EFFECTS OF AQUEOUS FRUITS EXTRACT OF *DIOSPYROS LOTUS L.* ON STREPTOZOTOCIN-INDUCED DIABETIC

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Since several years ago, diabetes has been treated orally with several medicinal plants or their extracts, based on folklore medicine [1]. These herbal remedies are apparently effective, produce minimal or no side effects and are of relative low costs as compared to oral synthetic hypoglycemic agents. Furthermore, after the recommendation made by WHO on diabetes mellitus, investigation of hypoglycemic agents from medicinal plants have become more important [2,3]. Hence, the aim of this study was to assess hypoglycemic effect of aqueous fruits extract of *Diospyros lotus L.* on streptozotocin-induced diabetic rats and the possible morphologic changes in the liver, kidney and heart. Diabetes mellitus was induced by a single intraperitoneal (IP) dose of 70 mg/kg of streptozotocin (STZ). Animals were post-treated with different doses of *D. lotus L.* (500, 750, 1000 and 1500 mg/kg) by oral administration (gavage) for 16 consecutive days after induction of diabetes [4]. In the special days (before treatment and 1, 8 and 16 days after induction of diabetes), according to a pre-planned schedule, animal's weight and their Fasting Blood Sugar (FBS), were determined in different groups under treatments. Administration of different doses of *D. lotus L.* (500, 750, 1000 and 1500 mg/kg) to diabetic animals caused significant decrease in glucose level, since the maximum reduction was observed in the animals group with 1000 mg/kg after 16 days post-treatment. ($P < 0.001$) Aqueous fruits extract of *D. lotus L.* at dose of 1000 and 1500 recovered significantly the body weight towards the control level. These results suggest that the product of *D. lotus L.* may provide a new therapeutic avenue against diabetes and diabetes-related complications-a global burden.

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HIGH-FREQUENCY *IN VITRO* DIRECT SHOOT REGENERATION FROM NODAL EXPLANTS OF HYSSOP PLANT (*HYSSOPUS OFFICINALIS L.*)

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Hyssop plant (*Hyssopus officinalis L.*) Belonging to Lamiaceae family, is a perennial herbaceous plant that is considered as an important medicinal herb whose areal parts are extensively used in many authentic pharmacopeias (1, 2). Considering its great medicinal value and possibility of its mass production through *in vitro* culture, two individual experiments studied. Effect of various concentrations (0, 2.2, 4.4 and 11 μmol) of two cytokines compound including TDZ and BAP in combination with 1 μmol of IAA on direct regeneration from nodal explants were studied. Significant difference was observed between the two hormones concerning the number of shoot-buds induction and regeneration percentage ($p < 0.001$). With BAP, the maximum shoot-buds induction (average of 9 shoot buds per explant) and shoot regeneration percentage (96.66%) were observed on MS medium supplemented with 2.2 and 4.4 μmol in combination with 1 μmol of IAA. For TDZ treatment, the highest regeneration percentage was achieved in MS medium supplemented with 2.2 μmol of TDZ and 1 μmol of IAA, and the maximum shoot-buds induction was observed in medium containing 4.4 μmol of TDZ in combination with 1 μmol of IAA. The highest frequency of root production as 89.5% was achieved in MS medium supplemented with 9.84 μmol of IBA and the lowest percentage as 20% was observed in hormone-free medium.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ASSESSMENT AND COLLECTION OF MEDICINAL MUSHROOMS IN THE FORESTS OF NEKA
(MAZANDARAN PROVINCE)

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Broad-leaved forests of Mazandaran one of the most important natural resources and capitan, which is the result of centuries of development and coordination of various ecosystems. The oak (*Quercus castaneifolia*) is one of the trees in these forests is valuable. This species is about 8.01 % of the volume of tree species in the forests north of country have been allocated. Conditions appropriate for the forest growth has provided many species of fungi. In this study, 50 species of macroscopic fungi in oak forests were collected and identified. Among the samples collected 9 species as fungi are known to have medicinal properties. Most of these species are wood-inhabitants.

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RESPONSE OF GRASS AND BROAD-LEAF WEEDS TO DIFFERENT RATE OF TRIFLURALIN:
IMPLEMENTATION FOR WEED CONTROL IN ANISE (*PIMPINELLA ANISUM L.*)

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Anise has been widely used in Iranian traditional medicine for their antimicrobial effects. Since it is characterized as a slow-growing and long seasonal plant, its protection from weed is essential. There is no herbicide registration for use in anise fields. Therefore, field experiment was carried out in 2011 to introduce an applicable chemical weed control in anise. In this experiment the efficacy of different rates of trifluralin for selective control of grass and broadleaf weed species and as well anise tolerance to these rate, were evaluated. The herbicide was applied preplant-incorporated at 0, 480, 960, 1440, and 1920 g a.i. ha⁻¹. A hand weeding control was also included. The results of this study indicate that anise was high tolerant to trifluralin since its seedling number and growth were not affected by herbicide even at the rate of 1920 g a.i. ha⁻¹ compared with hand-weeding check. At the rate of 960 g a.i.ha⁻¹ or greater were effective to maintain consistent control of grass, while, the rate of 1440 g a.i.ha⁻¹ or greater was required to maintain effective control of broad leaf.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECT OF SALINITY AND DROUGHT STRESSES ON GERMINATION CHARACTERISTICS OF ARTICHOKE (*CYNARA SCOLYMUS*)

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Artichoke or globe Artichoke (*Cynara scolymus* L.), a member of *Asteraceae* family, is native to the *Mediterranean* area [1]. The leaves are the parts which commonly used in pharmaceutical industry. Drought and salinity stress are the most important environmental factors in limiting growth and development of plants in dry and semi-dry areas such as Iran [2]. There are few reports on seed germination responses of artichoke cultivars to drought and salinity stress. The plant materials of the present work were three populations including one variety from Italy and two cultivated population from Hamadan and Isfahan. Two different osmotic compounds (NaCl and Polyethylene Glycol 6000) were used and four different water potentials (0.0; -0.3; -0.6 and -0.9 MPa) were constructed. The results showed that germination percentage and germination rate of artichoke seeds were significantly affected by salinity and drought conditions. The percentage and rate of seed germination decreased by increasing salinity and drought. According to the results of salinity stress, the highest value in germination percentage was observed by "NaCl-0.3" and the lowest was obtained from "NaCl-0.9" (22% and 0%, respectively) and the highest value in rate of germination was obtained from "NaCl-0.3" and the lowest one from "NaCl-0.9" (6.78 days and 0, respectively). Moreover, in PEG medium the highest and lowest values in germination percentage were resulted from PEG-0.3 (0.44) and PEG-0.9 (0%), respectively, and for germination rate the highest and lowest records were obtained from PEG-0.3 (4.73 days) and PEG-0.9 (0), respectively. The results of these treatments had significant difference with control (germination rate: 4.67 and germination percentage: %44). The highest germination percentage determined in Hamadan population and the lowest germination percentage related to Italian variety but the germination rate in Hamadan population was founded to be highest one. The results show that the seed germination stage of Artichoke's is very sensitive under salinity and drought stresses. The results provide a solid basis for breeding purposes of Artichoke to increase salinity and drought resistance in germination stage.

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ANATOMICAL STUDIES ON THREE SPECIES OF *TRIGONELLA* L. STEM IN KHORASSAN PROVINCE

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Trigonella L. belongs to fabaceae family. The number of *Trigonella* species in Iran is 32 which seven of them distributed in khorassan province. In the present research anatomical characteristics of stem of *T. monantha*, *T. monspeliaca*, *T. orthoceras* were studied. For this, the cross section of base of stems were prepared and stained by differential staining. Some differences were observed in the number of parenchymous layer, type of xylary and extra xylary fibers and the arrangement of vessels.

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DETERMINATION OF RUTIN CONTENT IN THE LEAVES OF *CAPPARIS SPINOSA* AT DIFFERENT TIMES OF THE DAY

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Capparis spinosa L.(caper) (family Capparidaceae) is one of the most common aromatic plants growing in wild and dry region around the West or central Asia and the Mediterranean basin. Iran especially Tafresh is one of the natural habitat of *Capparis spinosa*. The plant is known for its medical and aromatic properties. It contains large numbers of secondary metabolites in particular, rutin [2]. The objective of this study was investigating the variation in rutin content in different time of the day in plant leaves. Mature leaves were collected in July from Tafresh at an altitude of 1890 m. The leaves were harvested for three successive days every five hours from 6 AM up to 9 PM. Laboratory study was conducted in botanical laboratory of saveh branch, azad university. The plant samples were air-dried in a good air draft in the absence of direct sunlight and then ground for 30 minutes. The extraction was performed by using a solvent containing (methanol-acetic acid-water) for one hour on a shaker at laboratory temperature then centrifuged for 10 min at 2000 rot/min. According spectrophotometric method with ALCL₃ [1].the supernatant diluted 50 times, then was added ALCL₃ 5% in methanol. After 30 minutes absorbance at 420 nm was measured in solution. According the experiment there wasn't any significant difference in amount of rutin during these three days. The lowest rutin concentration was measured in the morning and rutin content didn't vary markedly in the morning but there was an impressive increase in rutin content up to afternoon. High content of rutin was measured in the afternoon. Although rutin content decreased up to night but it was more than its content in the morning and it offers the best time for harvesting leaves.

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EFFECT OF PLUM OSMO DEHYDROFREEZING ON THE TEXTURE, COLOR AND NUTRITIONAL CHARACTERISTICS

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Osmo dehydrofreezing is a combined process consisting of osmotic dehydration followed by air dehydration and then freezing. Today's production of various crop with high nutritional quality is very important. Purpose of This study is the production of crop with high nutritional and shelf life properties. In this study plums samples after peeling dipped in solution contains of sucrose, ascorbic acid and citric acid with different percentage. Then, under 65°C hot air, decreased samples moisture until (upto) 38 percentage. The samples immediate freezed after colding in 4-5°C temperature, and stored in -20°C temperature. And color test,s using image software, texture and ascorbic acid on freezed crop after two months. Data sratistical analysis done in randomized plan in significant 5% level (p<0.05). Finally result showed that treatment contain,s with 1%(w/v) ascorbic acid and 45%(w/v) of sucrose had the best effect's on end of crop [1,2,3].

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Kish Island



LEAF ANATOMY OF THE GENUS *PANICUM* L. (POACEAE) IN IRAN

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Panicum L. (millet), is the most important genus of Paniceae, distributed worldwide mainly in tropical and subtropical regions [1]. So far, six species of this genus have been reported in Iran [2-4]. *Panicum miliaceum* L. (known as common millet) has some health benefits. The fruits of this plant are diuretic and the flour is used for the treatment of respiratory diseases and simple diarrhea [5]. Furthermore, the recent studies have shown the antiplasmodial and analgesic effects of the leaf extracts of *Panicum* L. species [6]. In this study we investigated the anatomical features of the leaves in five species of *Panicum* L. In this work Characters such as the shapes of the large and small vascular bundles, the shape of adaxial surface of the main vascular bundles, the number of bundle sheaths, the integrity of vascular bundle sheaths, the location and frequency of the colorless cells were studied. The shapes of vascular bundles varied from circular to triangular in different species. All the species had two bundle sheaths with the exception of *P. antidotale* Retz. with only one bundle sheath. In the midrib of *P. repens* L., bundle sheath was not completed, and was connected to abaxial epiderm by schlerenchyma. All the vascular bundles in *P. repens* L. were accompanied by adaxial and abaxial girders in the apices of the ribs, while in *P. miliaceum* most of the vascular bundles were not accompanied by schlerenchyma. In Other species, most of the vascular bundles, but not all of them, were accompanied by schlerenchyma. The frequency of uncolored cells and their extension to abaxial epidermis were different between the species. Presence or absence of vascular bundles below the bulliform cells was another character investigated.

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INTRODUCTION OF SOME MEDICINAL PLANTS FOR COVER CROPPING IN CITRUS ORCHARD (CASE STUDY: AMOL REGION)

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Recently, weed is considered as most problematic enemies in citrus orchard especially at the first establishment of trees. Competition for nutrients and water, allelopathic interference with trees, host of many pest and diseases and reducing growth and development of plant are some problems with these plants. Using nonselective herbicide i.e. glyphosate and paraquat are a commonly method for weed controlling which lead to environmental pollution, weed resistance, soil erosion and etc. one important and suitable way for weed control in orchard in sustainable agriculture and organic productions is using different summer and winter cover crops such as clover, rye, alfalfa, faba bean, mung bean, millet, cow pea, common pea, beans and soybean. These plants rapidly grown and established after planting and compete with weed prior to establishment of citrus trees in early years. Different studies in region indicated advantages of these crops compare to chemical approaches. However, economic value of medicinal plants along with cover cropping properties could be a good alternative in citrus orchards. Some medicinal plants such as sweet basil (*Ocimum basilicum* L.), Medicinal pumpkin (*Cucurbita pepo* L.), spinach (*Spinacia oleracea* L.) and coriander (*Coriandrum sativum* L.) were evaluated in citrus orchard throughout two cropping season along with common mentioned cover crops and chemical method. Results showed that the medicinal plants could be recommended as a alternative of chemical method and is a good way in rotation with legumes cover crops. This approach can increase soil fertility, good host for pest natural enemies, reducing weed growth and prepare an income for farmers [1-3].

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ANTIBACTERIAL, ANTIOXIDANT AND OPTICAL PROPERTIES OF EDIBLE STARCH-
CHITOSAN COMPOSITE FILM CONTAINING THYMUS KOTSCHYANUS ESSENTIAL OIL

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Spices are rich in phenolic compounds, such as flavonoids and phenolic acids, that exhibit a wide range of biological effects, including antioxidant and antimicrobial properties which is almost invariably due to their essential oil fraction [1]. Thymus essential oils and extracts with antimicrobial and antioxidant properties are widely used in pharmaceutical, cosmetic, and perfume industry, also for flavouring and preservation of several food [2]. Nowadays, packaging research is receiving a considerable attention due to the development of eco-friendly materials made from natural polymers, often from waste products from agriculture, livestock raising, or fishing. Starch has been used to produce biodegradable films to partially or entirely replace plastic polymers because of its low cost and renewability. However, wide application of starch film is limited by its water solubility and brittleness. Chitosan films have relatively poor water vapor barrier characteristics [3]. One of the effective strategies to overcome the poor mechanical properties of this film, while preserving the biodegradability of the materials is Composite films that can be formulated to combine the advantages of each component. In this work Essential oil concentrations ranging from 0 to 2.0%, were used. The antimicrobial effects of films against four bacteria were determined by the disk inhibition zone method. Antioxidant properties were also determined by measuring total polyphenolic content and DPPH assay. The color values of the films were measured with a colorimeter and total color difference (ΔE), yellowness index (YI), and whiteness index (WI) were calculated. The transmittance of films was determined at 600 nm using a spectrophotometer. The statistical analysis of the data was performed through an analysis of variance (ANOVA) and Duncan's multiple range tests. Antimicrobial and antioxidant properties significantly increased with the incorporation of EO ($p < 0.05$). Incorporating EO increased total colour differences (DE), yellowness index (YI) and whiteness index (WI) which were significantly higher than control and its transparency was reduced. Our results pointed out that the incorporation of *Thymus kotschyanus* EO as a natural antibacterial agent has potential for using the developed film as an active packaging.

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ETHNOBOTANY OF MEDICINAL PLANTS FROM TABRIZ CITY, IRAN

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According to this fact that herbs have thousands years precedence in Iran and species and biologic diversity indicate Iran native and experimental knowledge. Investigation and registration of application of every region herbs seems necessary. This research aims to study and investigate Ethnobotany of some medicinal plants from different species in Tabriz in order to identify the customs and manner of application of medicinal plants in this region and preserve valuable reservoirs. In the mentioned area the data were collected and documented by studying native and traditional knowledge of authentic and skilled and familiar with traditional medicine attars and completion of questionnaire and interview. Local names confirmation with Persian names and scientific names, plant family, utilization, treatment properties and manner of application in the region were organized. According to the results Lamiaceae has the most species. The results show that Tabriz citizens are knowledgeable relative to surroundings and they treat their disease with medicinal plants [1-3].

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16, 17 May 2012
Kish Island



INTERACTION OF METHYL JASMONATE AND SALINITY ON MORPHOLOGICAL AND ANATOMICAL CHARACTERISTIC IN *BORAGO OFFICINALIS* L.

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Methyl Jasmonate is a one of the linolenic acid derivatives and has been identified as a vital cellular regulator that mediates diverse developmental processes [1], some important physiological properties [3] and defense responses against biotic and abiotic stress [2]. These research was conducted to study the effect of Methyl jasmonate against salt stress and morphological and anatomical characteristic. The plants were cultivated in greenhouse, in hydroponic culture at soilless culture research center of Isfahan University of technology. In the completely randomized factorial design with 4 levels of Methyl jasmonate (0, 0.01, 0.05, 0.1 μ M) and 4 levels of salinity (0, 60, 100, 200 mM) were added to plants. Results showed that Methyl jasmonate increased fresh weight, dry weight, Index of stomata, trichome number and trichome length in plants that exposed to NaCl and optimum concentration of Methyl jasmonate were 0.05 and 0.01 μ M.

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STUDY OF THE EFFECT OF PRE-SOWING HERBICIDES ON SEED GERMINATION OF *TRIGONELLA FOENUM-GRÆCUM*

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Although recently agricultural researchers try to reduce the use of chemicals in crop management but it seems effective weed control still depends on herbicides. The lack of specialized herbicides for medicinal plant led to high weed competition in farm and Subsequently reduction in quantity and quality of the products. Thought that pre-sowing herbicides will have fewer effects on herbal ingredients than others. Also chemical residues will be at least. In order to determine the effect of three pre- planting herbicides (Trifluralin, DCPA and EPTC) on *Trigonella foenum-graecum* seed germination, a laboratory experiment was conducted in growth chamber condition in 2011. Herbicides in three dosages consist of "over dose" (3.5 litter/ha Trifluralin, 15 kg/ha DCPA and 8 litter/ha EPTC), "in dose" (2 litter/ha Trifluralin, 10 kg/ha DCPA and 5 litter/ha EPTC) and "lover dose" (0.5 litter/ha Trifluralin, 5 kg/ha DCPA and 2 litter/ha EPTC) were applied on fenugreek seeds in Petri dishes (50 seed in each one). Growth chamber was adjusted in 65% RH on an average of 25°C for 7 day. Results show Seed germination was inhibited by EPTC levels completely and without any significant difference by control in levels of Trifluralin. In the use of DCPA just the dosage of 15 kg/ha could restrict the seed germination (seed germination percentage was 12%). but in 5 and 10 kg/ha there was no significant difference with control. It may be conclude we can use Trifluralin and DCPA for early season weed control in fenugreek although for more confidence, similar experiment must be done in field condition

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



BIOSYSTEMATIC STUDY OF TWO MEDICINAL SPECIES OF *A. PSEUDOALHAGI* AND *A. GRAECORUM* (FABACEAE) IN IRAN

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Alhagi (Fabaceae) composed of annual and perennial plants. This genus with 2 species in Iran as *A. pseudoalhagi* and *A. graecorum* are of medicinal and forage importance (1). In this project biosystematic study of *Alhagi* species in Iran with emphasis on leaf anatomical observations, chromosomal behavior (meiosis) and micro-morphology of fruit and seed were done. Meiotic study was based on 17 accessions of *Alhagi* species of Iran. Chromosome behavior like anaphasic bridge, Stickness in metaphase I, laggard chromosome in metaphase I, B chromosome in meiocyte, ring and rod bivalent, univalent, quadric- valent and tripolar were observed. Such structural modification in chromosome causes increase in genetic variation which can result in adaptation to environmental conditions (2,3). In order to determine the most variable characters among the populations, factor analysis based on principal component analysis (PCA) was performed. Anatomical observations were done on 14 populations of *Alhagi* species in Iran. 39 anatomical features of leaf blade cross sections and epidermis were studied and coded. Statistical analyses were done. Meiotic chromosomal evidences were not in concordant with leaf anatomical results. In general leaf anatomical results support the traditional species separation. Identification key based on anatomical results for *Alhagi* species in Iran was provided. Fruit and seed micro-morphological observations were done on 12 populations of *Alhagi* species by evaluation of 11 micro-morphological fruit and seed features. Cluster analyses of populations and species by WARD method were done and it was in concordant with anatomical results. An identification key based on fruit and seed micro-morphological observation was provided.

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THE EFFECT OF DIFFERENT LEVELS OF POTASSIUM SULFATE, ON THE POTASSIUM ABSORPTION OF SAFFRON ONION AND LEAF

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Saffron is a herbal and chromic plant. Saffron is one of the major items of export at present that only 20 percent of it used as domestic consumption and the remainder is exported to other countries in the world. Saffron is one of the most valuable spices and also it is very valuable as a drug. [1]. For this purpose an experiment was conducted in a randomized complete blocks design with three replications in Birjand in 2010. Saffron bulbs were planted in pots with a height of 30 cm and 28 cm in diameter. Different levels of potassium sulfate were added to the pots as a treatment in 9 levels of 0, 40, 80, 120, 160, 200, 240, 280, 320, 360 and 400 kg per hectare. After 6 months the percentage of potassium was measured in leaves and onions of saffron to determine the maximum absorption of this element by the saffron. Results obtained from this experiment showed that potassium fertilizer at 1% had a significant effect on leaf potassium so that with the 240 kg of potassium sulfate per hectare, the maximum amount of leaves potassium was 2/32 that in comparison with control mode it had increased 210 percentages. The maximum potassium of onion with consuming 200 kg of potassium sulfate per hectare also obtained to 0/96 percent. According to the obtained results using optimal amounts of potassium sulfate fertilizer recommended to achieve the maximum absorption of potassium by saffron.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



SOLUTIONS OF PROCESSING AND PACKAGING MEDICINAL PLANTS IN IRAN

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Approach internationally successful markets, exportation strategy should be evolved, and this evolution generally includes three main aspects comprising product's high quality, suitable packaging and precise marketing. Packaging is the most important ring linking production, maintenance, transportation and marketing. First, could be mentioned from the production challenges to: weak situation of the country in medicinal plants production compared to the other countries, inappropriate cultivation of medicinal plants, over-consumption of medicinal plants and the risk of their extinction, lack of enough research in the medicinal plants diversity identification and lack of bank facilities for preparation of machines and instruments for medicinal plants production. Could be mentioned from the supply and publicity challenges to: inappropriate publicity regarding medicinal plants, lack of knowledge of the Iranian physicians about medicinal plants, lack of proper medicinal plants' distribution in certain apothecaries and inappropriate presentation of imported medicinal plants considering reduction of their remedial properties. Could also be mentioned from the trade sector challenges to: insufficient participation of Iran in global trade of medicinal plants, lack of accurate statistics in medicinal plants industry and entering the world markets. Challenges regarding development of packaging industries include: packages and containers' low quality, internal producers' lack of information about role and importance of packaging and homemade packaging machines' low quality and high-tech packaging systems' expensiveness. Then, could be mentioned from the production solutions to: conversion of medicinal plants into more stable compounds, education and training of experts, circulation and exploiting new scientific methods, protection and preservation of valuable germplasms, cultivation of international desirable species, promoting knowledge level and developing research projects, insuring medicinal plants, agricultural mechanization development, increasing cultivation areas of medicinal plants and their replacement capabilities, strengthening link between medicinal plants' scientists and physicians. Could be mentioned from the supply and publicity solutions to: educating medicinal plants' consumption, standardization of medicinal plants' packaging, disposing of festivals to promote medicinal plants products' quality, converting medicinal plants' sale into a conventional process, circulating and promoting medicinal plants' supply using helps of the media.

Could also be mentioned from the trade and export sector solutions to: encouraging participation in the export of quality medicinal plants based on the world's demand, quality standardization, establishing appropriate and dynamic competition, ongoing activities of health centers and pharmaceutical faculties, reduction of medicinal plants' prices, standardization of medicinal plants' packaging, disposing of local and national exhibitions of medicinal plants and their reducible industries, having the global way of medicinal plants' consumption.

ANATOMICAL STUDY ON SOME SPECIES OF THE GENUS *RUMEX* L. IN KHORASSAN PROVINCE NE OF IRAN

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The genus *Rumex* L. (Polygonaceae) has eight species in khorassan province [3]. In this research anatomical study on stems of *R. crispus* L., *R. dentatus* L. and *R. chalepensis* Miller, Gard. were done. The specimens were collected from Torbate Heydarieh, Chenaran and Ferdows. Then cross section of the base of stem was prepared and stained with carmin and green methyl. The results showed, epidermis cells, the number of layers of parenchyma and collenchyma tissues in the cortex, the shape of vascular band, the number layers of fiber, secretory duct were different [1,2].

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Kish Island



EXTRACTION OF PHENOLIC COMPOUNDS FROM *ACHILLEA ERIOPHORA* AND EVALUATION OF THEIR ANTIOXIDANT ACTIVITIES *IN VITRO*

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Achillea eriophorea, Asteraceae is an endemic species in Khorassan province of Iran [1], which is greatly used in folk medicine. Medicinal plants are the source of a wide variety of natural antioxidants [2]. An increasing interest has been attracted for phenolics in recent years because of their significant bioactivities, such as scavenging free radicals, chelating metals, regulating enzyme activity, and modulating cell proliferation which have been associated with the beneficial effects of polyphenol-rich diets on human health [3]. In this study, phenol and flavonoid contents of *A. eriophora* were measured and regression between phenolics and antioxidant activity was evaluated. Extraction process was carried out on dry powders of leaves, flowers, stems and aerial parts of *A. eriophora* with maceration and shaking methods, separately. Total phenol and flavonoid for each extract were determined by colorimetric methods [4,5], and then antioxidant properties were measured depending on their 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activities [6]. Methanolic extracts of flower and leaves prepared by maceration method, showed the highest level of phenolics. Total phenol and flavonoids were determined as 1050.829 and 244.06 mg/100 g dry leaves, and 812.23 and 216.56 mg/100 g dry flowers, respectively. Methanolic leaf and flower extracts efficiently reduced DPPH radicals in a dose-dependent manner, and the IC₅₀ values were reported as 0.82 and 1.8 mg/ml, respectively (20 µg/ml for Ascorbic acid as positive control). There was an inverse regression between phenolic concentrations with DPPH scavenging activity ($r^2=0.951$ for leaf extract and $r^2=0.976$ for flower extract).

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EFFECTS OF CYTOKININ (BAP) ON FLOWER YIELD OF TWO CULTIVARS OF SAFFLOWER (*CARTHAMUS TINCTORIUS* L.)

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Safflower is an annual crop cultivated for its seed and flowers. The dried flowers of safflower have been used as a crude drug in traditional Asian medicine for over 2,000 years. The active compounds are red (water- insoluble) and yellow (water- soluble) pigments, which have been used to decrease pains and menstruation problems [1]. Curative effects on cardiovascular diseases, myocardial infection and cerebral thrombosis are pharmaceutical properties of safflower pigments [2]. The red pigment in the petals of safflower tubular florets was also originally used as raw material for cosmetic and textile dye, and today safflower pigments are used as safe coloring agent in food industry [3]. In order to investigate the effect of cytokinin (BAP) on flower yield of safflower, a field experiment was conducted in university of Zanjan at 2011. Experiment was conducted in a randomized complete block design (RCBD) with a factorial arrangement of two factors with three replication. Factors included cultivars in two levels (Goldasht and Zendeherod) and BAP application (Control and Spray of BAP (50µM) in flowering stage). The result of study showed that BAP application increased flower yield (25%) in Zendeherod cultivar but had no significant effect in Goldasht. Increasing of flower yield, with BAP application, due to reduced in infertile head in Zendeherod cultivar. The flower yield of Zendeherod cultivar was higher than Goldasht cultivar but the flowers of Goldasht cultivar redder than Zendeherod cultivar. Flower yield had positive correlation with number of secondary branch ($r=0.674$), number of secondary head ($r=0.625$) and diameter of secondary head ($r=0.827$). Higher yield in Zendeherod cultivar is related to the higher number secondary branch, number secondary head, diameter of secondary head and lower infertile head. Higher red color in Goldash cultivar maybe due to higher Carthamin component in its floret.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF CINNAMON ON BLOOD GLUCOSE AND SERUM LIPIDS NON INSULIN DEPENDENT DIABETES MELLITUS

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Diabetes mellitus is one of the most common endocrine glands diseases which unfortunately have increased dramatically in recent years. In this chronic disease occurs dysfunction in glucose and lipid metabolism that is due to pancreatic beta-cell dysfunction and insulin resistance too. Regular and routine medical care is effective in controlling and preventing diabetes complications. Complementary and alternative therapies are better than drug treatments. Recent study is a systematic review by searching in valid and reliable sources that recently have obtained from valid Internet sites such as INLM, Pubmed, iranmedex, SID and etc in 2000-2012. Cinnamon is a herb that plays role in glucose and lipid metabolism in the body. Cinnamon drug effects were studied for nearly 20 years ago. Scientific name of this plant is *Cinnamomum*. It has many varieties. The first human test was on people in Pakistan that was with *cinnamomum cassia*. Effect of cinnamon herb is Activity of insulin-like that it is done with the activity of insulin receptors. A cinnamon medicinal property is such as antioxidant and anti-bacterial effect. Cinnamon has been shown in human studies health benefits of the regulation of glucose and triglycerides, LDL cholesterol and total cholesterol levels and improve capillary perfusion. High incidence of cardiovascular diseases exist in type II diabetic patients, so blood glucose control, cholesterol and triglycerides in these patients is a critical issue. Cinnamon extract increases glycogen breakdown and helps to glucose and lipid metabolism. Use of cinnamon is In the course of two weeks, 20 days or 40 days as much as 1,3 and 6 grams per day and that should be taken continuously. Cinnamon powder or capsules can be used. The results of investigations showed that this plant can reduce blood glucose, triglycerides, LDL cholesterol and total cholesterol levels. Therefore, due to more safety, lower cost, lower risk, lower side effects and easier is better we use complementary and alternative therapies rather than drug treatments. recommended Most herbal and alternative medical treatments are introduced, as well as the inclusion of diet and herbal products instead of chemicals, our health and society is guaranteed.

MODELING AND ANALYSIS OF SAFFRON PRODUCTION AS A SPICE AND MEDICINAL MAJOR PLANT FOR CROPPING PATTERN IN KHORASAN RAZAVI PROVINCE OF IRAN

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Saffron (*Crocus sativus* L.) is a cash crop acclimatized to hillsides and plateaus of arid and semi-arid regions [1] although majority cultivated in east of Iran annually around 55000 hectares with production more than 180 tones [2]. Saffron is one of crops that have competition with other field crops in Khorasan Razavi province compared by benefit to cost ratio. Modelling of production helped us to understand how it goes up area of cultivation every year and what points are more important to manage increasing of saffron to have a balance between market demand and resources use efficiency. Cropping pattern programming showed the most important factors of saffron competition are water requirement, non overlapping of water requirement with few crops, history of good minimum price in market and excellent reflects to enhance of farm management. In addition it is fitted to small holder farmers conditions. In an overview results showed there are potential of increasing saffron cultivation in some cities area like Torbat-Heydarieh, Khaf, Kashmar and Nishabour. But in other areas saffron competition for taking resources not overcomes by other major field crops. When model runs for more efficiency in water uptake individually, saffron comes in the higher level of cultivation pattern table. But in a goal programming with multi objective frameworks it is recommended only for 32 percent of khorasan province farms. This type of research is an economic and biologic analysis for saffron production that can be used for other new comer plants, like medicinal plants, to cultivation pattern of any region [3].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ALLELOPATIC POTENTIAL OF *THYMUS DAENENSIS*

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Thymus daenensis Celak. is a perennial plant from Lamiaceae family. Its height is about 15-30 cm, with no stem branches and almost without petiole and trichomes. In this study we evaluated its allelopathic effects on *Amaranthus retroflexus*, *Avena fatua*,

Panicum eruciferum, *Datura stramonium*, *Lepidium sativum* and *Capsicum annum* germination and related traits. For this purpose, *Thymus* plants were collected from Fars Province, to determine allelopathic potential. Factorial experiment was conducted using completely randomized design. The first factor was different regions, and the second factor was *Thymus daenensis* essential oil concentrations. Measured traits at the end of germination period were germination percentage, germination rate, roots and shoot length, roots and shoots fresh and dry weight and allelopathic potential. In general, higher essential oil concentration resulted in lower germination percentage and/or rate. The overall results of germination test represent a reduction in most seeds at concentration of 200 ppm. The inhibitory concentration amaranth seeds were 800 ppm, and this concentration in oat and jimson weed seeds were 600 ppm. There was no germination inhibitory concentration for cress seeds and reduction in germination was significantly started at 600 ppm. Also relatively similar results were obtained from other traits such as roots and shoot length and roots and shoots fresh and dry weight.

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EVALUATION OF MORPHOLOGICAL AND PHYTOCHEMICAL CHARACTERISTICS OF *THYMUS DAENENSIS* CELAK. IN FARS PROVINCE

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Thymus daenensis Celak. is a perennial plant from Lamiaceae family. Its height is about 15-30 cm, with no stem branches and almost without petiole and trichomes. This plant is one of valuable medicinal plants and due to its phytochemical properties can be used highly in medical and pharmaceutical industries, but not so much researches has been done on it. Due to the exclusiveness of this plant to our country, Iran, these plants were collected from Fars Province, to determine phytochemical properties. The experiment was conducted during 2010 and the experimental design was Completely Randomized Design (CRD) with 4 replications. Characteristics such as plant height, leaf length and width, leaves chlorophyll content, essential oil percentage, and essential oil components were studied. Essential oil analysis was performed using GC (Gas Chromatography) and GC/MS (Gas Chromatography, Mass Spectrometry). Analysis of variance showed that there was significant difference among collected plants from different regions regarding morphological traits such as leaf length. Also analysis of variance of essential oil yield and its components showed that there is significant difference between 1,8-Cineol, γ -terpinen, Thymol, Carvacrol and *trans*-Caryophyllen between different regions. The highest Thymol content was obtained from Safashahr (74.55%), and the highest Carvacrol was observed from Moursosani (63.34%) and Bavanat (58.86%), respectively. Overall, two chemotypes of Thymol (Safashahr) and Carvacrol (Moursosani, Bavanat, Eqolid) were found.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



IN VITRO DIRECT REGENERATION FROM SHOOT TIP AND COTYLEDONARY EXPLANTS OF ANNISE HYSSOP (*AGASTACHE FOENICULUM*)

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Anise hyssop (*Agastache foeniculum*), is an medicinal and aromatic herb, with wide variation in the composition and content of its essential oils, such as methylchavicol and 1,8-Cineole [1]. In the present study, *in vitro* direct regeneration from shoot tip and cotyledonary explants of *A. foeniculum* was investigated. explants were cultured on MS medium supplemented with four different concentrations of BAP (0. 2.2, 4.4, 8.8 μ M) in combination with IAA (1 μ M) and hormone free MS medium as control treatment. Regeneration was induced in both explants cultured in the most of media. ANOVA showed significant difference between treatments. Cotyledonary explants cultured in MS medium containing 1 μ M IAA and control medium not showed regeneration, the highest means (46.4) and maximum number (65) of regeneration were achieved from cotyledonary explants cultured in MS medium fortified with combination of 4.4 μ M BAP and 1 μ M IAA, the lowest means (1) and minimum number (1) of regeneration were achieved from shoot tip explants cultured in MS medium fortified with 1 μ M IAA and control medium. This experiment is the first report on direct regeneration from shoot tip and cotyledonary explants.

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EFFECT OF HARVEST TIME ON UNRIPE AND RIPE BERRY ESSENTIAL OIL CONTENT OF *JUNIPERUS COMMUNIS* L. GROWING WILD IN MAZANDARAN, IRAN

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Juniperus communis L. commonly known as juniper berry (Fam. *Cupressaceae*) is a dioecious or rarely monoecious shrub or tree growing wild in mountainous area in northern Iran. There are two types of berry on the shrub. The first are current year berries that remain green until the end of growth season and the second are black berries that formed at past year. The healing power of berry essential oils is higher than that of twigs. The volatile compounds of berries exhibited stimulant, antimicrobial, antirheumatic, diuretic, stomachic, antiseptic, sudorific and a lot of other activities. This study was conducted to determine the best harvest time of unripe and ripe berries of juniper berry for highest essential oil content. Unripe and ripe berries was collected from *Juniperus communis* L. growing wild in three different month (June, August, October (when the whole plant was covered by snow)) from the alborz mountain at an altitude of 2200 m located in the Mazandaran, Iran. The essential oils were extracted by hydrodistillation (4h) of dried berry. The results showed that the highest essential oil content of ripe (black) and unripe (green) berries were 2.77% and 3.5%, respectively that achieved at June. Also the lowest essential oil content of both berries was obtained at october. This fluctuation is likely due to changes the ripening cycle of the berries. In conclusion the suitable time for harvesting of both ripe and unripe juniper berry to achieve the highest content of essential oil is at June.

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EFFECT OF CO-INOCULATION WITH MYCORRHIZA AND PGPR ON RELATIVE GROWTH RATE AND STEVIOSIDE CONTENT IN *STEVIA REBAUDIANA*

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Stevia rebaudiana (Bert.) is a bush having its main economic and social value in its production of steviol glycosides. The culture of stevia can be favored if young plant plugs are obtained in adequate conditions from protected environments, favorable substrates and by the use of arbuscular mycorrhizal fungi (AM) and PGPR. Mycorrhizas are symbiotic associations that establish themselves among the roots of the majority of vegetal species and soil fungi [1,2]. As a result, biofertilized plants are more competitive and tolerant of adverse environmental condition than non-colonized plants [3]. The objective of the present experiment was to evaluate effect of co-inoculation with arbuscular mycorrhizal fungi (AM) and PGPR on the development and production of steviol glycosides from *Stevia rebaudiana*. To this end, an experiment was conducted in a greenhouse to test species of AM fungi (*Glomus intraradice*), 3 PGPR (*Bacillus*, *Pseudomonas* and *Azotobacter*) and a control treatment without inoculation. Plantlets obtained from tissue culture were planted in sterile soil and each treatment was repeated 4 times. The harvest was made at 15, 30, 45, 60 days after culture and height, fresh weight and pigment content of leaves measured. Also relative growth rate was accounted. The aerial part was dried in an oven at 50°C and the dry weight and steviol glycoside concentration were determined. The roots were tinted for colonization evaluation. The production of dry-leaf masses was significantly superior for co-inoculated treatments compared to control or one microorganism alone. Also accumulated quantity of steviol glycosides was significant between treatments and coinoculation treatments showed higher steviol glycosides relation to control.

The results demonstrate that the use of suitable combination of mycorrhizal fungi and PGPR can significantly increase the production of biomass and the concentration of steviol glycosides.

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EFFECTS OF SOME STRESS FACTORS (SALINITY AND HEAVY METALS) ON STOMATA AND TRICHOMES OF IRANIAN BORAGE (*ECHIUUM AMOENUM*: BORAGINACEAE)

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Many morphological features of plants are affected by environmental factors among them the aerial parts are most markedly. A little investigation has been done on the effects of salinity and heavy metals toxicity on stomata and trichomes of plants. In the present work effects of different concentrations of salinity and Cadmium on stomata and trichomes of Iranian borage (*Echium amoenum*: Boraginaceae) were investigated. For this, the seeds of studied plant obtained from a reputable supplier were cultivated in hydroponic medium followed soaking in 3 concentrations of salinity (0, and 100 mM) and 3 concentrations of Cd (0, 60 and 90 mM), respectively. The experiments were conducted in random factorial design with 3 replicates. The mean and standard deviation of characteristics in modified plants were scored. All experiments were also performed in Soilless Culture Research Center of, Isfahan University of Technology. Stomata diameters, areas and trichomes in lower surface of leaves of treated plants were measured by image processing in light microscope and were analyzed by using Dino-Lite (AM-423X) analysis software. The results showed that all stomata diameters, areas and trichomes were affected significantly in all treated plants compared to controls. As previously reported the main effects were decrease in photosynthetic activity and reducing stomata aperture [2]. Petals of *E. amoenum* has long been used as a tonic, tranquillizer, diaphoretic and as a remedy for cough, sore throat and pneumonia is known in traditional medicine of Iran as Gol-e-Gavzaban. New research also shows that this plant has antidepressant effects [3], analgesic and is stimulating the immune system [1]. Therefore study of the effects of various stress factors in this traditional medicine plant is valuable.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



STUDY ON YIELD, YIELD COMPONENTS, THE AMOUNT AND TYPE OF FLAVONOIDS ON GERMAN CHAMOMILE (*MATRICARIA RECUTITA* L.) CULTURED IN HYDROPONIC CONDITIONS

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This study was performed in two consecutive years (2010-2011), in order to determine the qualitative and quantitative characteristics of German chamomile (*Matricaria recutita* L.) cultured in hydroponic conditions. Effect of nutrient solution and Bed culture on yield and yield components of chamomile and total amount of flavonoids and components of flavonoids include patuletin, quercetin, lutein, apigenin was evaluated. Culture substrates used included sand + perlite (1:1), cocopeat + sand + perlite (1:1:1), cocopeat, cocopeat + perlite (1:1) and four nutrient solution used included Hoagland, Schneider, Cooper and nutrient solution was proposed by the executive. The results of this study showed significant differences on two successive years in the amount of total flavonoids and apigenin. So that the amount of flavonoids on the first year was higher than the second year (15.75 and 15.56% respectively). Apigenin amount was increased on first year than second year (respectively 2.1 and 1.08 mg/g.fw). Other flavonoids showed no significant difference on two consecutive years. Results of this study showed the interaction between medium and nutrient solution culture on performance of the chamomile, but many of the differences between treatments were small and can not be recommended a particular bed and solution in this regard. Medium type and nutrient solution culture also influenced the amount of flavonoids. Increase in the amount of these compounds was observed in some of the mediums and nutrient solutions. Effect of year on number of flowers per plant and on plant fresh weight was significantly, so that on the first year, the number of flowers per plant was less than second year, however plant fresh weight was higher in the first year. It is therefore concluded that vegetative growth on the first year was higher than second year and so reduced the number of flowers instead increased fresh weight of plant, this could be due to different climatic conditions on two consecutive years of this research.

CHEMICAL COMPOSITION OF THE ESSENTIAL OIL OF *ARTEMISIA AUSTRICA* JACQ. GROWING WILD IN IRAN

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The genus *Artemisia* (Asteraceae) comprise approximately 400 species of commonly perennial and fragrant herbs distributed in the northern temperate region of the world. *Artemisia austriaca* JACQ. is one of the most common species of the genus distributed from central Europe to Siberia, Turkey and Iran. In Iran, the plant is indigenous to north Azerbaijan and Ardabil province. In the north west of Iran, this plant is used as a medicinal plant for treatment of digestive disorders. Afsantin is the common name of *Artemisia* species in Iran where they are used as medicinal herb in folk medicine. In the present work, the essential oil of aerial parts of *Artemisia austriaca* was obtained by hydrodistillation using a Clevenger type apparatus. After dehydration, the essential oil was analyzed by GC and GC-MS. Our results showed that Camphor (15.88%), 1,8-Cineole (10.75%), Camphene (3.53%) and β -fenchyl alcohol (3.03%) were the main components among 61 constituents characterized in the oil [1]. The results also showed that essential oil profile of *A. austriaca* is markedly different from those of other species of the genus. Our findings also indicated that there is high similarity among major compounds of the essential oil of our sample, collected from Ardabil province in Iran with sample from Turkey. Thus, two samples are considered as same chemotype [2, 3].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



ISOLATION AND IDENTIFICATION OF TWO PYRANOCOUMARINS FROM *ZOSIMA ABSINTHIFOLIA* (VENT) LINK ROOTS

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Zosima absinthifolia (Vent) Link (Apiaceae) is a perennial herb indigenous to Iran. It has been used as a medicinal plant from ancient time in Iran, Turkey and Pakistan. The aerial parts of this plant are edible after cooked in East Turkey. Crushed fruits of the plant have been used in Iran and Eastern Turkey as a food spice and food flavoring, as well as. In the present work, air-dried and powdered plant roots were extracted with *n*-hexane, dichloromethane and methanol, respectively, using soxhlet apparatus. The dichloromethane extract was subjected to vacuum liquid chromatography (VLC) and preparative thin layer chromatography (P-TLC) to yield two pyranocoumarin, aegelinol and agasyllin. The structure of isolated compounds have been elucidated by UV, IR, 1D and 2D NMR spectral data with dose reported in the literature [1,2]. The antimicrobial assay was performed using agar dilution method. The results showed that purified compounds have modest to weak antibacterial and antifungal activity. The results also have chemotaxonomic significance. It was well documented that the genus *Zosima* is allied to *Heracleum* [3]. Our results can be led us to the conclusion that chemical content of two genera is different.

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RESPONSE SURFACE METHODOLOGY FOR OPTIMIZING THE ULTRASONIC-ASSISTED EXTRACTION OF GREEN TEA IN ORDER TO FIND THE MINIMUM CAFFEINE CONTENT

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As a traditional drink, green tea is now becoming popular all over the world. In vitro and epidemiological studies strongly suggest that green tea has potential protective effects against many diseases [1]. The catechins contained in green tea, exhibit a variety of health-benefiting effects, including antioxidative, anticancer, antiaging, and antiviral effects, the consumption of green tea is increasing rapidly [2,3]. Caffeine which is contained in green tea exerts relatively adverse effects, such as sleep deprivation, abortions and miscarriages, and hypersensitivity. Considering the adverse effects of caffeine, some efforts have been made to remove caffeine from tea. The present study describes ultrasound-assisted extraction as a preconcentration method for caffeine determination by high performance liquid chromatography–diode array detector (HPLC-DAD). In order to investigate the ability of the proposed extraction method, target analyte was subjected to different extraction conditions (i.e., temperature, time, percentage of solvent, proportion of solvent to green tea and the power of ultrasound bath) and Box-behnken design (BBD) was applied as a powerful tool to optimize the obtained data. After completing the experiments, the samples were injected to HPLC-DAD and the results were analyzed with Minitab software. Optimum conditions were concluded by obtained statistical model as follow, time: 40min, temperature: 30°C, mesh size: 30, power of ultrasound bath: 600 watt, percentage of ethanol: 96, the proportion of green tea to solvent 1:10.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



DEVELOPMENT OF ULTRASOUND-ASSISTED EXTRACTION FOR DETERMINATION OF EGCG IN GREEN TEA USING BOX-BEHNKEN DESIGN

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Recently, the demand for green tea has increased due to human health concerns and preference [1]. Pharmacological properties of green tea are due to its primarily catechins. The main catechin component in green tea extracts is epigallocatechin-3-gallate (EGCG) [2]. The effect of EGCG in humans has been thoroughly investigated and is considered to have antioxidant, anti-mutagenic, anticarcinogenic, and anti-HIV activity [3]. In addition, EGCG is considered to prevent dental caries, and to reduce the risk of cardio-vascular injury. The present study describes ultrasound-assisted extraction as a preconcentration method for EGCG determination by high performance liquid chromatography–diode array detector (HPLC-DAD). In order to investigate the ability of the proposed extraction method, target analyte was subjected to different extraction conditions (i.e., temperature, time, percentage of solvent, proportion of solvent to green tea and the power of ultrasound bath) and box-behnken design (BBD) was applied as a powerful tool to optimize the obtained data. After completing the experiments, the samples were injected to HPLC-DAD and the results were analyzed with Minitab software. Optimum conditions were concluded by obtained statistical model as follow, time: 80min, temperature: 70°C, mesh size: 30, power of ultrasound bath: 600, percentage of ethanol: 84, the proportion of green tea to solvent 1:15.

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ALLELOPATHIC EFFECTS OF AQUEOUS EXTRACT OF SHOOT AND ROOT OF LICORICE (*GLYCYRRHIZA GLABRA* L.) AND PIGWEED (*AMARANTHUS RETROFLEXUS* L.) ON GERMINATION CHARACTERISTIC AND SEEDLING GROWTH OF CORN AND CHICKPEA

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In order to investigate the allelopathic effects of shoot and root aqueous extract of licorice (*Glycyrrhiza glabra* L.) and pigweed (*Amaranthus retroflexus* L.) on seed germination and seedling characteristic of Corn (*Zea mays* L.) and Chickpea (*Cicer arietinum* L.), a research was conducted based on completely randomized design with four replications. Treatments were four levels (25, 50, 75 and 100%) of leaf, stem, flower and root water extracts medicinal plants (*Glycyrrhiza glabra* L.) and (*Amaranthus retroflexus* L.) with distilled water as control. Results showed that there were allelopathic effects in Velvet flower and Glycyrrhizin, effect of aqueous extract of different plant parts on germination traits of maize and chickpea was not similar. Increasing the aqueous extract concentrations of separated Velvet flower and Glycyrrhizin plant parts significantly inhibited maize and chickpea percentage and rate of germination, length of radical and hypocotyls and increased time to 10 and 90% of germination. The degree of allelopathic effects of different Velvet flower and Glycyrrhizin plant parts can be classified in order of decreasing inhibition as follows: stem, leaf, flower and root, and between two medicinal plants, Glycyrrhizin indicated more allelopathic effects on germination traits [1, 2].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EVALUATION OF EFFECTIVE PARAMETERS ON COLORING ABILITY OF SAFFRON EDIBLE EXTRACT

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Saffron is widely cultivated in Iran and is one of the natural edible dyes with high economical and biological value which is used to increase acceptability of foods in society. It is known as a spice and obtained from the dried stigma of saffron flower (*Crocus sativus*). Many compounds and properties of stigma have been considered as volatile agents (safranal), bitter principles (picrocrocin), dye materials (crocetin and its glycosidic, crocin) and pharmacologically actives so far. Color must have high quality and safety and its addition to foods have relation with food nutrition value. Saffron stigma includes Crocin, Picrocrocin, Safranal which are related to its color, flavor and odor, respectively. Up to now many scientists make pharmacological extract, but the aim of this research is production of saffron extract with increasing its quality factors. This product is extracted with polar solvent and produced as a ready to use solution which can be diluted in water and include saffron color, odor and flavor. Our research up to now shows that the best method for producing saffron extract is use of the hydroalcoholic solvent. In this study, for colour extracting, two methods with two different temperatures and soaking it for three days was compared and results showed that when we used temperature for extracting, the extraction ability was decreased considerably.

EFFECT OF *ZATARIA MULTIFLORA BOISS.* ESSENTIAL OIL ON LOG P% OF *VIBRIO PARAHAEMOLYTICUS* IN BHI BROTH WITH PH VALUE OF 6.5

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Chemical preservatives are usually used to reduce or eliminate pathogenic or spoilage microorganisms but their inordinate applications have resulted in toxigenic residuals and adverse effects on consumers. So, many researches have been done to substitute the chemicals with naturally occurring compounds, especially plant essential oils. In other hand, *Vibrio parahaemolyticus* which has been isolated frequently from different type of seafood can cause an acute gastroenteritis as a result of consumption of contaminated raw or low cooked seafood containing infectious dose of mentioned organism. *Vibrio parahaemolyticus* has known as one of main cause of food poisonings in eastern Asia, USA and some European countries consequently result in economic costs and reduction the level of public health. In continuation of these objectives, during this study log P% of *Vibrio parahaemolyticus* ATCC 43996 was investigated with different concentrations of *Zataria multiflora* Boiss. essential oil (0, 0.005, 0.015, 0.030, and 0.045%) in BHI broth during incubation period at 35° C at Ph value of 6.5 for 43 days. Log P% of this organism was affected very significantly ($p < 0.001$) with all concentrations of *Zataria multiflora* Boiss. essential oil. *Vibrio parahaemolyticus* didn't grow in any tubes of 0.030 and 0.045% concentration of essential oil and maximum level of log P% was calculated as -4.241. Maximum log P% of this bacterium in 0.015 and 0.005% concentration of essential oil was achieved at 11th day and respectively was 0.454 and 3.563, whereas the maximum log P% for 0 concentration of essential oil at 13th day was 3.902. In conclusion the log P% of *Vibrio parahaemolyticus* was decreased by increasing concentration of essential oil.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



IN VITRO SHOOT MULTIPLICATION OF *BUPLEURUM GHAHREMANII* A NATIVE MEDICINAL PLANT OF IRAN

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Bupleurum is species of flowering plant in the Apiaceae family. There are three exclusive *Bupleurum* species in Iran. To the Best of *Our Knowledge*, it was not reported any work until now on these *Bupleurum* species. *Bupleurum* species are very important medicine plants and useful in the tonic system because of its ability to relieve liver tension and digestive disturbances, and because its actions are detoxifying and anti-microbial [1]. It has some known effects such as anti-inflammatory, hepato-protective, mild sedative, antipyretic, analgesic, adaptogen, and anti-tussive [2]. Our study describes the shoot multiplication through *in vitro* micropropagation of *Bupleurum Ghahremanii* by using culture medium supplied with different growth regulators. Nodal segments and shoot tips of *B. Ghahremanii* were obtained from plants growing around of Tabriz. Explants were disinfected by dipping in a 70% alcohol for 10 s, 10 min in 0.5% NaOCl solution, and rinsed three times with sterile-distilled water. Maximum explant response was from axillary shoots and the highest number of shoots per explant was obtained on MS fortified with 1.0 mg/l BAP. The highest degree of axillary shoot proliferation was found to be 70 and 80% for nodal and shoot tip explants, respectively on the medium containing 1.0 mg/l BAP + 0.1 mg/l NAA. The combination of BAP and TDZ was also found to be effective for both type of explants. The degree of shoot formation was affected by explant types and the exogenous hormonal doses in the medium. The regenerated shoots were successfully rooted on half MS supplemented with 1.0 mg/l NAA. The best survival rate (60%) was obtained when plantlets were grown in greenhouse. Also micropropagation using axillary shoot proliferation from nodal and shoot tip culture is the most desirable and safe as micropropagules to minimize genetic variation, which can be the source for less variable pharmaceutical preparations [3].

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STUDDING GENETIC DIVERSITY OF CHAMOMILE BASED ON CHEMICAL COMPOSITION OF ESSENTIAL OIL USING GAS CHROMATOGRAPHY

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Chamomile is a medicinal plant, which has high medical and economic value [1, 2]. First step for plant breeding is knowledge of genetic diversity and relationship term between genotypes [1]. Gases chromatography is an efficient method for segregation of organic and inorganic compound. In this research in order to investigate of genetic diversity of *Chamomilla* ecotypes in Iran, a total of 20 ecotypes (16 ecotypes *Matriccaria chamomilla* and 4 ecotype *stripleurospermum*) from 11 provinces of Iran have been collected. The essential oil was prepared by hydro-distillations. The analysis of essential oil composition was done by Gas Chromatography. Blockading time was used as a marker for investigation of chemical diversity. Cluster analysis was done using SPSS software. According to the results, the investigated ecotypes were clustered in fivegroups. The result was to some extent agreed with geographical distribution.

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16, 17 May 2012
Kish Island



INVESTIGATION OF CHEMICAL COMPOSITION OF CHAMOMILE ESSENTIAL OIL USING GC/MS

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Chamomile is a medicinal plant, which has high medical and economic value [1]. In this research five ecotypes of chamomile were collected from different states of Iran including: 3 ecotype of *Matriccaria chamomilla* (Golbaft (Kerman), Esfandagheh (Kerman) and Dehdasht) and 2 ecotype of *Tripleurospermum* (Shahrekord and TorbatHeidarieh). The essential oil was prepared by hydro-distillations [2]. The oil color of *Matriccaria chamomilla* ecotypes was blue and The oil color of *tripleurospermum*eco types was yellow. Composition, blockading index and quantitative percentage of oils were identified using GC/MS. 17 compounds fromEsfandaghe essential oil, 30 from Dehdasht, 15 from Shahrekord, 13 from Golbaft and 29 from Torbat Heidarieh were identified. The α -Bisabolol was found in Esfandaghe ecotype more than other, which is an importantanti-inflammatory compound. The Chamazulene was exist in *Matriccaria* ecotypes but was not found form *Tripleuro* ecotype, which is cause of the blue color of essential oils. The β -Farnesene which is used as an insecticide, was found in all of the ecotypes.

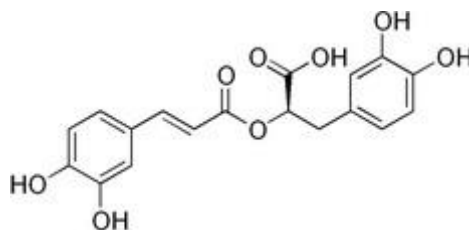
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ESSENTIAL OIL COMPOSITION AND ANTIOXIDANT ACTIVITY OF *SALVIA STAMINEA* BENTH. EXTRACTS

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The genus *Salvia* with about 900 species growing worldwide is the largest genus of Lamiaceae family. This genus consists of around 60 species in Iran, 17 of which are endemic¹. Many of these species have been used in folk medicine for different kinds of diseases like common cold, coughs and chest trouble². Reports have proved that this genus is a good source of antioxidants for the food and cosmetic industries³. Essential oil composition and antioxidant activity of various extracts of *Salvia staminea* Benth. from Iran were investigated. Essential oil of *S. staminea* was isolated by hydrodistillation and characterized by GC and GC-MS methods. Thirty two compounds representing 93.3% of the oil were identified. The major components were germacrene D (36.3%) followed by hexahydrofarnesylacetone (11.2%) and α -copaene (7.0%). Various extracts of root and aerial parts of *S. staminea* were screened for their antioxidant properties using 2,2-diphenyl-1-picrylhydrazyl (DPPH), ferric reducing antioxidant power (FRAP) and ABTS assay. The level of rosmarinic acid content in the root and aerial parts extracts of *S. staminea* was determined by HPTLC method. The amount of rosmarinic acid in the root (0.42 mg/g) was more than two folds of its amount in the aerial parts (0.20 mg/g).



Rosmarinic acid

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



BIOLOGICAL EFFECTS OF FERTILIZERS ON GROWTH, YIELD AND YIELD COMPONENTS OF BLACK CUMIN (*NIGELLA SATIVA* L)

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Nigella sativa is an annual flowering plant, native to Iran and other part of southwest Asia, belonging to the buttercup family (Ranunculaceae). Its grain has different properties such as anti-parasitic, anti-virus, anti-bacterial, increases milk, carminative, and anti-diabetics. This experiment was conducted in randomized complete block design in three replications with seven treatments. Fertilizer treatments were consisted of Bio phosphor (B 2kg/ha), Bio sulfur (S 5kg/ha), Biological fertilized phosphate 2 (F 100g/ha), chemical fertilizer (M) according to soil analysis, and as well combined fertilizer (B + S), (S + F), and (C) treatment. The application of fertilizers showed a significant effect ($p < 0.05$) on plant height at flowering time, number of capsules per plant, seed weight, grain yield (g/m²), number of flowers per plant, biological yield (g/m²). There was not observed any significant differences ($p < 0.05$) on the number of seeds per capsule, seed weight and harvest and between chemical fertilizer and biological fertilized phosphate 2. There can be conclusion made regarding the preference of biological fertilizer in order to have a good performance of seed and undertakes a broad range of activities to reduce risk to our environment.

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DIVERSITY OF ALGAE IN NEYSHABUR AND SUBURBS AND PHARMACEUTICAL POTENTIAL OF SOME ALGAE.

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Algae are chlorophyll having species which in term significant and differentiation didnt reach to the level of higher plants and have different orders that have been seprated based on morphology, pegments, reproductive structures and reproductive methods, material storage and physiology. Identifying algae is important in order to understand their biological diversity. This study is going to reviews the founa diversity of algae has been done in Neyshabour and suburbs and during sampling from May to August samples collected from several stations and moved to lab. Some of the samples fixed in formalin 4% and others cultured in N-8 and BG₁₁ medium, also several physicochemical factors such as light, temperature, pH, EC and different elements in water were studied. After growth the samples, slides were prepared and identified with Prescott key. As well as some medicinal potential was evaluated. Most of identified samples of green algae were belonging to the order Chlorococcales of family Oocystaceae. In syanobacteria two families Chroococcaceae and Oscillatoriaceae were plentiful. With analyzing the physicochemical factors, direct relation between diversity and abundance with analyzed factors were observed.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



IN VITRO ANTIFUNGAL ACTIVITY OF TAMARIX RAMOSISSIMA AGAINST TRICHOPHYTON VERRUCOSUM

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Dermatophytosis (ringworm) is one of the most important and most common fungal diseases of the skin. This disease is shared between humans and animals [1]. *Trichophyton verrucosum* is a zoophilic dermatophyte which is a frequent cause of ringworm in humans [2]. According to studies in the world, including Iran, the most important cause of tinea capitis and tinea corporis in rural communities is *T. verrucosum* [3, 4]. Because of the high cost and long duration of treatment and side effects, interactions and possible drug resistances in treatment of dermatophytosis, identification of more effective and cheaper drugs with fewer side effects, preferably of natural origin, seems that is necessary [5-7]. In early April, stem skin of *Tamarix ramosissima* was collected and dried. After preparation of aqueous extract by infusion method, antifungal effects of various concentrations of the extract in dimethylsulfoxide were evaluated in comparison with terbinafine against *T. verrucosum* by both disc diffusion and MIC methods. In the disc diffusion assay, the extract at concentration of 400 mg/ml showed significant antifungal activity equivalent to the concentration of 10 mg/ml terbinafine. In MIC method, the aqueous extract inhibited the growth of fungus at 20% concentration. According to these findings, we can say that *T. ramosissima* have antifungal effects against *T. verrucosum* and stem skin of this plant can be considered as a natural matter with antifungal activity.

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SEPARATION OF 1,8-CINEOL FROM ESSENTIAL OIL OF EUCALYPTUS GLOBULUS LIVES AND SYNTHESIS OF NEW DERIVATIVES

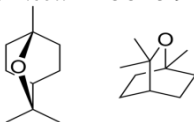
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Eucalyptol has a fresh camphor-like smell and a spicy, cooling taste. It is insoluble in water, but miscible with ether, ethanol and chloroform. The boiling point is 176 °C and the flash point is 49 °C. Eucalyptol forms crystalline adducts with halogen acids, o-cresol, resorcinol, and phosphoric acid. Formation of these adducts are useful for purification. The essential oils from the leaves of *Eucalyptus globulus* were isolated by hydro distillation in two fractions and analyzed by GC/ MS. 14 components which were identified in *E. globulus*. The oil consisted mainly of monoterpenes and sesquiterpenes. The major components found in the oil of fractions of 1 and 2 were 1,8-cineol (89.07-77.6%), α -Pinene (4.5-11.5%) and Viridiflorol (0.65-5.39%). Then subjected fraction 1, (its richen from 1,8-Cineol) with concentrated H₂SO₄ in ethanol solvent and refluxed for 3h for synthesis of new derivatives. The inhibition zone was determined by disc diffusion method and the MIC was measured by microplate dilution method. As a result: *E.coli* ATCC 25 922 , and *S. aureus* ATCC 25923.



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EFFECT OF SEED OSMOPRIMING ON GERMINATION AND SEEDLING GROWTH OF RADISH (*RAPHANUS SATIVUS L.*) UNDER SALT CONDITIONS

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Members of cruciferous family such as broccoli, cauliflower, radish, brussels sprouts, and cabbage that are rich in health beneficial secondary metabolites which include sulfur containing glucosinolates and S-methylcysteine sulfoxide, flavonoids, anthocyanins, coumarins, carotenoids, antioxidant enzymes and other minor compounds [1]. Seed priming (osmopriming) consist of imbibing seeds in an osmotic solution that allows pregerminative metabolism to proceed, but prevents radical emergence [2]. The aim of this study was to investigate the effect of seed priming on germination and seedling development of red radish (*Raphanus sativus L.*) under salt conditions. The experiment was conducted in a factorial arrangement based on completely randomized design with four replications at Sari Agricultural Sciences and Natural Resources University during 2010. Seeds of radish were osmotically primed in 30, 60 and 90 mM NaCl for 6, 12 and 18 hours at 20°C. Twenty primed seeds were put in petri-dishes and treated by different levels of salinity (0, 30, 60 and 90 mM NaCl). The results revealed that different osmopriming, duration and different salt stresses had significant effects on germination and seedling growth. Primed seeds with high salty solutions (90 mM NaCl) and in less duration (6 hours) showed the best germination percentage, root length, shoot length, root fresh weight, shoot fresh weight and ratio of shoot weight to root weight. The increasing NaCl concentration more than 30 mM significantly decreased all measured traits. By contrast salt stress at 30 mM increased germination percentage and the other traits. Meanwhile, interaction effects of salt stress and osmopriming induced significant differences in root length and shoot length. The less amount of shoot length and root length (2.82 and 8.24 cm, respectively) were observed in primed seed with 30 mM NaCl in 90 mM salt stress and the most amount of these traits (5.30 and 9.39 cm, respectively) were obtained in primed seeds with 90 mM under 30 mM salt stress. The previous studies has been shown an improved germination due to seed osmopriming (NaCl) which is related to an increase in the gibberellin (GA) concentrations content via GA biosynthetic gene activation and a subsequent increase in the expression of genes related to endosperm cap weakening [3]. Finally, according to the results of the present study, it can be suggested that osmopriming (NaCl-priming) with high levels of salinity can improve radish seed germination.

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PERFORMANCE EVALUATION OF *CALENDULA OFFICINALIS* EXTRACT IN REDUCING THE ADVERSE EFFECTS OF AFLATOXIN ON THE IMMUNE SYSTEM OF BROILER CHICKENS

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Effect of dietary aflatoxin on the immune system of broiler chickens was studied using extracts of *Calendula officinalis*. A period of 28 days, two levels of zero, 2 ppm of aflatoxin B1 in the diet of chicks were applied. The completely randomized factorial experiment was conducted with 180 broiler chickens in the experimental period, concentrations of serum immunoglobulin G, albumin to globulin ratio was determined by the number of lymphocytes and monocytes. Safety levels by eating diets of chickens infected with aflatoxin-free extract greatly decreased (P < 0/05). *Calendula officinalis* extract improves immune parameters were used. It was found that *Calendula officinalis* extract at 5 mg kg diet had a good effect on the immune system.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EVALUATION OF THE HEPATOPROTECTIVE EFFECT OF *PORTULACA OLERACEA* AND *CAPSELLA BURSA-PASTORIS* AGAINST INDUCED LIVER INJURY IN RATS

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In a project to study the hepatoprotective effect of some plant extracts two plants *Portulaca oleracea* and *Capsella bursa-pastoris* were studied. The methanol extract of the aerial part of the plants were subjected to hepatoprotective assays using Wistar rats. Liver injury induced in rats using carbon tetrachloride. The biochemical parameters such SGOT, SGPT, ALP and total bilirubin were estimated as reflection of the liver condition. All the results were compared with Silymarin, the reference hepatoprotective drug. All of the treatment groups showed hepatoprotective effect against CCl₄ induced hepatotoxicity by significantly restoring the levels of serum enzymes to normal which was comparable to that of Silymarin group. The biochemical observations were supplemented with histopathological examination of rat liver sections.

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ESSENTIAL OIL COMPOSITION AND ANTIOXIDANT ACTIVITY OF DIFFERENT EXTRACTS OF *NEPETA BETONICIFOLIA* C.A. MEYER AND *NEPETA SACCHARATA* BUNGE

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Nepeta is a genus of Lamiaceae family with 250 species which are found in Asia, Europe and North Africa. The genus is represented by 67 species in flora of Iran [1]. Essential oils of *Nepeta* species mainly contain different isomers of nepetalactones as the main components. Antibacterial, antifungal, antiviral and opioid analgesic activities have been attributed to nepetalactones [2]. Some Iranian *Nepeta* species have been used in Iranian folk medicines [3] and used for treatment of various sicknesses, such as nervous, respiratory and gastrointestinal diseases [2]. Aerial parts essential oil of *Nepeta betonicifolia* and *N. saccharata* were obtained by hydrodistillation and analysed by GC-FID and GC-MS. Thirty-three and eighteen components represented 97.9% and 98.2% of the total oils identified, respectively. Main compounds of the oil of *N. betonicifolia* were 4 α ,7 β ,7 α -nepetalactone (42.0%), germacrene D (6.0%), triplal (5.2%), 1-nor-bourbonanone (4.0%) and 1,8-cineole (3.2%). The principal constituents of the essential oil of *N. saccharata* were found to be 4 α β ,7 α ,7 β -nepetalactone (66.9%), germacrene D (12.9%), sabinene (6.5%) and *trans*-caryophyllene (3.3%). The radical scavenging capacity (RSC) of methanol extracts and chloroform, butanol and water subfractions of aerial parts of *N. betonicifolia* and *N. saccharata* were evaluated by using DPPH, FRAP and ABTS assays. Total phenolic content (TPC) of each extract was measured using Folin-Ciocalteu method. The antioxidant activity of the butanolic subfractions of both plants was higher than other extracts examined.

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EFFECT OF *CAPPARIS SPINOSA* L. (CS) (CAPPARIDACEAE) EXTRACT ON SOME OF LIVER ENZYME OF GLUCOSE METABOLISM PATHWAY IN DIABETIC RAT

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Many traditional treatments have been recommended in the alternative system of medicine for treatment of diabetes mellitus. *Capparis spinosa* L. (CS) (Capparidaceae) is reported to have a number of potentially useful medicinal properties including anti-oxidative, antifungal, antihepatotoxic, anti-inflammatory and anti-diabetic. (1-2). The aim of this study was to determine the effects of *Capparis spinosa* L. (CS) (Capparidaceae) extract on some of liver enzyme of glucose metabolism pathway in diabetic rat. eighty male rats were divided into 8 groups of 10, diabetic groups received 200,400,800 mg/kg *Capparis spinosa* L. (CS) (Capparidaceae) extract and 2ml distilled water, normal groups received 200,400,800 mg/kg *Capparis spinosa* L. (CS) (Capparidaceae) extract and 2ml distilled water for six weeks. At the end of the experimental period fasting blood samples were collected and enzymes Hexokinase, Glucokinase, Glucose-6-Phosphate Dehydrogenase and Glucose-6-Phosphatase Activities were determined by using spectrophotometric methods according to the manufacturer's instructions (Cayman Chemicals, Ann Arbor, MI, USA). And Levels of gene expression enzyme phosphofructokinase-1 was evaluated by real time PCR. Concentration of insulin was measured with Roche Diagnostics GmbH ultrasensitive Rat insulin Elisa. Findings of the present study showed that hydroalcoholic extract of *Capparis spinosa* L. (CS) (Capparidaceae) can significantly decrease ($p < 0.0001$) serum levels of FBS, a significant increase ($p < 0.0001$) in insulin concentration and enzymes activity in *Capparis spinosa* L. (CS) (Capparidaceae) treated groups. These beneficial effects of *Capparis spinosa* L. (CS) (Capparidaceae) extracts in diabetic rats could probably be due to the antioxidant capacity of its polyphenolic and kaempferol, rutin, quercetin and quercetin content.

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EFFECT OF *MORUS ALBA* LEAF EXTRACT ON SOME OF LIVER ENZYME OF GLUCOSE METABOLISM PATHWAY IN DIABETIC RAT

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Many traditional treatments have been recommended in the alternative system of medicine for treatment of diabetes mellitus. *Morus alba* (mulberry) leaf is a natural therapeutic agent that has been shown to have an antidiabetic effect (1-2). The aim of this study was to determine the effects of *Morus alba* (mulberry) extract on some of liver enzyme of glucose metabolism pathway in diabetic rat. Forty eight male rats were divided into 4 groups of 12, diabetic groups received 1 mg/kg *Morus alba* (mulberry) extract and 2ml distilled water, normal groups received 1 mg/kg *Morus alba* (mulberry) extract and 2ml distilled water for six weeks. At the end of the experimental period fasting blood samples were collected and enzymes Hexokinase, Glucokinase, Glucose-6-Phosphate Dehydrogenase and Glucose-6-Phosphatase Activities were determined by using spectrophotometric methods according to the manufacturer's instructions (Cayman Chemicals, Ann Arbor, MI, USA). And Levels of gene expression enzyme phosphofructokinase-1 was evaluated by real time PCR. Concentration of insulin was measured with Roche Diagnostics GmbH ultrasensitive Rat insulin Elisa. Findings of the present study showed that hydroalcoholic extract of *Morus alba* (mulberry) can significantly decrease ($p < 0.0001$) serum levels of FBS, a significant increase ($p < 0.0001$) in insulin concentration and enzymes activity in *Morus alba* treated groups. These beneficial effects of *Morus alba* (mulberry) extracts in diabetic rats could probably be due to the antioxidant capacity of its polyphenolic and dihydroxycoumarin, prenylflavone, cudraflavone B, C, Resveratrol content.

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Kish Island



EFFECT OF HERBAL EXTRACT OF THE *VIOLA ODORATA* ON MORPHOGENESIS OF MICE EMBRYO

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The *Viola odorata* has been used in country from past but recently clinical prescribed in Migraine encourage to survey teratogenic effects of *viola* on morphogenesis of mice embryos after their pregnancy. We applied aqueous extracts of the herbs in different concentration 2.5mg, 12.5mg, 25mg and mice received daily these dosages in three groups the fourth groups was sham and received distilled water during the 6-15 pregnancy as Gavages. Maternal mice killed on 16 day of pregnancy with chloroform and their embryos collected. Embryos studied macroscopically and microscopically with H & E staining. Changes in weight, size, and height and malformation were record. In addition, embryos fixed in Bouin's Fixative and ethanol 95% to study serial section for bone malformation. The results show changes in abdominal and liver region in dosages 12.5 mg and 25 mg and bleeding around in liver and heart but their tissues not damaged and Changes in bone not observed. Using *viola* in Migraine headache continuous from Avicenna to now so according to the results of this study it's better to use *viola* in low dosage in headache because of *viola* hasn't malformation in low dosage.

EFFECTS OF VERMICOMPOST AND SPENT MUSHROOM COMPOST ON PERCENT AND COMPOUNDS OF ESSENTIAL OILS OF SAVORY MEDICINAL PLANT

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Currently the demand for drugs with natural origin is increasing. Savory (*Satureja hortensis* L) is belonging to labiateae family, which has edible and medicinal consumption. To determine the effects of organic fertilizers on growth and secondary metabolites of iranian savory (*Satureja hortensis*) Shahr raey two pot experiment based on Randomized complete design were conducted in Research farm of Horticultural Department of Mohaghegh Ardabili University at 2009 and 2010. Experimental treatments include different rate of cow manure vermicompost (10, 20, 30, 40 and 50%) and washed and unwashed spent mushroom compost (SMC). The base medium (control treatment) was a mixture of 75% from cultivated farm soil and 25% of sand. Results revealed that replacement of vermicompost and spent mushroom compost (SMC) in plant growth medium has significant effect on essential oil yield and component. The most pronounced components of savory essential oil were Carvacrol and p-cymene the highest and lowest value for essential oil yield were obtained by substitution of 40 washed spent mushroom and control respectively. The maximum and minimum amount of carvacrol was obtained from plants grown in beds containing 50 % of washed spent mushroom and control respectively. The highest amount of τ -Terpenine was obtained in plants grown in beds having 20% vermicompost and the lowest level for this compound derived from plants in bed containing 50% washed spent mushroom.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE EFFECTS OF *ALLIUM HIRTIFOLIUM* EXTRACT ON SERUM ADIPONECTIN CONCENTRATION AND INSULIN RESISTANCE IN NORMAL AND WITH STREPTOZOTOCIN-NICOTINAMIDE INDUCED TYPE 2 DIABETES RATS

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Adiponectin is a novel adipose tissue-specific adipokine that can increase insulin sensitivity. Many studies have shown anti-obesity and anti-diabetic effects of *Allium Hirtifolium* consumption [1-2]. In this study we examined the effects of *Allium Hirtifolium* extract on circulating adiponectin levels and insulin resistance status in Normal and with streptozotocin-nicotinamide induced type 2 diabetes Rats (T2DM). Forty-eight male rats were divided into 6 groups of 8, diabetic groups and control received 100 and 200 mg/kg *Allium Hirtifolium* extract, diabetic control and normal control received %0.9 saline for 49 days. At the end of the experimental period fasting blood samples were collected and FBS, Insulin, Fasting serum adiponectin, HOMA-IR, HbA1c, TG, LDL and HDL were measured. We found a significant effect of *Allium Hirtifolium* extract on increasing the logarithm of serum adiponectin in diabetic Rats ($0.15 \pm 0.10 \mu\text{g/ml}$, $P < 0.05$). A significant independent correlation between the logarithm of serum adiponectin and WHR (Waist to Hip Ratio) was found ($P = 0.009$, $t = -2.7$). Findings of the present study showed that hydroalcoholic extract of *Allium Hirtifolium* can significantly decrease serum levels of FBS, TG, LDL and HbA1c in treated groups (in a dose dependent manner) ($P < 0.05$). The serum levels of insulin slightly increased by *Allium Hirtifolium*. The results showed that consumption of *Allium Hirtifolium* extract can be useful in the control of T2DM by increasing the levels of serum adiponectin and controlling FBS, TG, LDL and HbA1C levels in diabetes Rats.

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THE EFFECT OF DIFFERENT IRRIGATION INTERVALS AND MINERAL NUTRITION ON SOME MORPHOLOGY CHARACTERISTICS OF AJOWAN (*TRACHYSPERMUM AMMI*)

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In order to investigate the effect of different irrigation intervals and different mineral nutrition on seed yield and essential oil of Ajowan, an experiment was conducted at the agricultural research station, University of Siatan in 2011. For this purpose a split plot experiment based on a Complete Randomized Block Design with three replications was used. Treatments included three irrigation intervals (7, 14 and 21 days) set as main factor, mineral nutrition level was (Nitrogen 120 kg ha⁻¹, Potassium 150 kg ha⁻¹, Phosphorus 200 kg ha⁻¹, Zinc 25 kg ha⁻¹, Magnesium 25 kg ha⁻¹ and control). Results indicated that irrigation had significant effect on Morphology characteristics of Ajowan. With increasing irrigation intervals, number leaf of stem, lateral branches, number leaf of lateral branches, diameter stem, plant height, dry weight, fresh weight were decreased. Mineral nutrition had significant effect on morphology characteristics of Ajowan. Results indicated that the maximum number leaf of stem, lateral branches, number leaf of lateral branches, diameter stem, plant height, dry weight, fresh weight was obtained in Nitrogen. Our results showed that the maximum number leaf of lateral branches, fresh weight and dry weight was obtained in irrigation intervals 7 days with Nitrogen. *Trachyspermum ammi*, commonly referred as Bishop's weed, Carom seed (English names) and Ajowan or ajwain or omum in Indian languages, is an erect annual herb with striate stem originated in Persia and India. According to Ayurveda, the Ajowan seeds are hot, pungent, stomachic, appetizer, aphrodisiac, carminative, laxative and diuretic. Ajowan is traditionally used as remedy for gastric disturbances and as a digestive aid. The thymol & carvacrol derivatives and other minor components from Ajowan are responsible for their yield properties [1, 2].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



INVESTIGATE THE EFFECT OF SPRAYING NITROXIN FERTILIZER ON YIELD AND YIELD COMPONENTS OF MEDICINAL PUMPKIN SEED (*CUCURBITA PEPO* L.)

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Recently the use of biofertilizers in production of medicinal plants serves as suitable approach with respect of human health and environment aspects. Pumpkin (*Cucurbita pepo* L. var *stearica*) is one of the important medicinal plants. To investigate the effects of biofertilizer namely nitroxin on yield and yield components of seed in pumpkin an experiment based on Randomized complete block design with three replications was carried out in Research farm of Agricultural Faculty of Mohaghegh Ardabili University at 2011. Experimental treatments include foliar spraying time (1 and 2 time) and nitroxin fertilizer concentration (0, 0.5, 1, and 1.5 percent). Results showed that twice foliar spraying with 0.5 percent concentration of nitroxin increased seed yield and 1000- seed weight and reduced the number of hollow seed. The highest grain yield (1090 kg/ha) and the lowest number of hollow seed (12/9) was obtained by twice foliar spraying of 0.5% concentration of nitroxin. The maximum and minimum number of seed per fruit 184 and 64 seed was obtained in spraying of 0.5% concentration of nitroxin and control treatments.

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EFFECT OF WATER DEFICIT STRESS ON GROWTH AND DEVELOPMENT AND ACTIVE CONSTITUENTS OF *SILYBUM MARIANUM*

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Water stress is one of the most important environmental stresses affecting agricultural productivity all over the world. In order to examine the effect of different levels of water stress on growth, development and active constituents in Milk Thistle, A pot experiment was carried out in *Silybum marianum* cultivar "Majarestan" in the form of completely randomized design. Treatments were applied with adjusting soil water potential by TDR to -0.33 (T1), -4 (T2), -8 (T3) and -12 (T4) bar and the randomized complete block design experiment with five treatments (levels of water stress) with four replications were carried out under field experiment. Irrigation treatments included -0.33 as a control (T1), -4 (T2), -8 (T3), -12 (T4) and -12 (T5) bar. Results indicated that water stress decreased plant length, number of leaf per plant, shoot fresh weight, shoot dry weight, number of capitule per plant, axillary capitule diameter, seed yield in terminal and axillary capitule and one thousand seed weight in both experiments. Drought caused a significant reduction in root fresh weight, root dry weight, root length and root diameter in pot experiment. The results indicated that main capitulue diameter was the only morphological trait, which was not significantly influenced by water stress levels in pot and field experiment. The results showed that most content in silibin a, b and total related to -4 and -12 bar in pot experiment and field experiment respectively. Most content in silymarin related to -4 bar in both experiment. The results showed not significant effect on antioxidant activities in pot experiment. However the highest antioxidant activities related to -12 bar in field experiment. The highest oil percentage obtained in -4 bar in both experiment. However, increase in drought level and time because decrease either leaf chlorophyll and leaf chlorophyll florescence (Fv/Fm). The highest leaf chlorophyll and leaf chlorophyll florescence (Fv/Fm) related to control in 2 week after water treatment and control in 6 week after water stress in pot expriment. The highest leaf chlorophyll observed in -8 bar in 2 week after water treatment that not significant difference between control in 2, 4 and 6 week after water treatment in field experiment and highest leaf chlorophyll florescence (Fv/Fm) related to control in 2 week after water stress. In both experiment the lowest leaf chlorophyll and leaf chlorophyll florescence (Fv/Fm) related to -12 bar in 6 and 8 week after stress. Consequently the results of this experiment showed that secondary metabolism was increased under water deficit stress. Also according to the results of this study can be expressed that Milk Thistle plants under field conditions have shown more resistance than the pot conditions.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



COMPARISON OF ESSENTIAL OIL IN DIFFERENT PARTS OF THE VEGETATIVE BODY OF TARRAGON PLANT

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In order to compare the Oil production of different plant parts of Tarragon (*Artemisia dracunculus*) an experiment based on Completely Randomized Design (CRD) with three replication was conducted in Faculty of Agriculture the University of Mohaghegh Ardabili in 2011. Different parts of Tarragon plants including fresh and dry leaves, stem and rhizome were separated after harvesting, then sample with 20g weight were prepared. The essential oils of samples were extracted by Kelevenjer device for 2 hours via hydro-distillation method. Results revealed that different organs of tarragon plants showed significant difference for traits including Percent and essential oil yield and biological yield of essential oils in the ($P < 0.01$). The highest and lowest amount for essential oil percentages 24.6 and 0.44 were obtained from dry leaves and stem respectively. The maximum value for essential oil yield 492.8 cc/m² was derived from dry leaves while the minimum yield of essential oils 44.8 cc/m² was extracted from stem also Rhizome of tarragon plants has higher essential oil content in comparisons to stems.

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EXTRACTION OF ANTIOXIDANTS FROM *ROSMARINUS OFFICINALIS* PLANT USING ULTRASOUND PROCESS

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Rosmarinus Officinalis is a rich source of antioxidants. A large number of polyphenolic compounds with antioxidant activity have been identified in this plant such as carnosic acid, carnosol, rosmanol, epirosmanol, 7-methylepirosmanol, and methyl carnosate. The rosemary extract product has antioxidative, antimicrobial and anti-inflammatory property and is used in the food industry and cosmetics. In this study, quantitative determination of total phenolic compounds in rosemary leaves is conducted by ultrasound extraction method. Ultrasound method has been shown to enhance the solvent extraction of materials at low temperatures and with reasonable product yields. Initial experiments involved an investigation of the total amount of solid material extracted into solvents from a known mass of dried rosemary leaves. Then the proportion of this extract which comprised the total phenolic compounds in the extracts is assessed. In addition, the effect of plant particle size on the yield of the total phenolic compounds in extracts is studied. The studied plant particle sizes are ranging 0.25-0.5 mm, 0.125-0.25 mm, and <0.125 mm. The experiments are performed by ethanol as solvent. The total phenolic content of the rosemary extracts are determined by spectrometer using Folin-Ciocalteu's reagent. The total phenolic content is expressed as mg gallic acid equivalents per 1 g of dried sample material. Double analyses are performed for each extract. The results show that there is relationship between the total phenolic content and particle size of plant.

MUCILAGE EXTRACTION FROM MALLOW (*MALVA SYLVESTRIS*) DIFFERENT ORGANS AND OINTMENT PRODUCTION FOR WOUND AMEND

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Mallow (*Malva sylvestris* L.) is a medicinal plant belongs to family of Malvaceae. Mallow has medicinal mucilage, special in fruits. This mucilage can be used to heal and soothe inflammations. This research was done to extraction and evaluates the mucilage from different organs of mallow. In this study, the different organs mucilage was extracted by heat water and acetone. An ointment for wound amends was produced by plant water extraction. The results showed that flowers have the highest mucilage but the roots have lest mucilage. The ointment was effective for wound amend. The different organs of mallow have very mucilage but there is the highest mucilage in flower, no in fruits. The mallow ointment was produced in this research support wound amend effective of plant salve.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



CATHARANTHUS ROSEUS TISSUE CULTURE AND REGENERATION FROM CALLUS, MULTIPLE SHOOTS

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The periwinkle (*Catharanthus roseus* L. (G.) Don) is the most important medical plants in the world. It produces several commercially valuable secondary metabolites including the anticancer agent, vinblastine, vincristine and the hypertension drugs, ajmalicine and serpentine. Plant tissue culture is a technique of *in vitro* cultivation of plant cells and organs, which divide and regenerate into whole plants or organs and produced new and high medicinal plants at short time. In this investigation, seeds of periwinkle were cultured on MS mediums after sterilization. Seedlings (4 day old) and segments of leaves and cotyledons of seedlings were subcultured to medium containing 2,4 – D accompanied with Kin. With addition of hormones in specific amounts and proportions, the samples can be induced to callus. These callus were subcultured in the best mediums and developed in multiple shoots(20%) . multiple shoots were isolated and sub cultured in free hormones mediums for root producing. In this medium, many whole plants produced. New plants cultured in pot in greenhouse.

EFFECT OF NITRATE TO AMMONIUM RATIO ON ESSENTIAL OIL CONTENT AND COMPONENTS OF PEPPERMINT (*MENTHA X PIPERITA* L.)

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Medicinal plants like other plants take nutrients from the soil during growth. Among macroelements, nitrogen results in the largest growth and yield response in medicinal plants. High nitrogen levels may decrease medicinal plant growth and secondary metabolite accumulation. Over 200 different constituents have been identified in peppermint oil. The most important compounds in peppermint are menthol, menthyl acetate, menthone, menthofuran, and pulegone . The objective of this study was to investigate the effect of different NH₄/NO₃ ratios on the growth, essential oil content and components of peppermint (*Mentha x piperita* L.) in a hydroponic system. The experiment was carried out in a glasshouse conditions. The peppermint (*Mentha x piperita* L.) was cultivated in a hydroponic system with drip irrigation. A mixture of perlite and coconut fiber (50:50) was used as substrate. There were five nutrient solutions of differing NH₄:NO₃ ratios as follows: 0:100, 20:80, 40:60, 60:40, and 80:20. Experiment was carried out using a completely randomized design (CRD) with three replications. Each replicate contained four single pots. The experiment was arranged in a randomized complete block design. The experiment was continued for five months. The aerial parts of harvested plants were air-dried in the shade, and then flower heads and leaves were subjected to hydro distillation for 3 h using a Clevenger-type apparatus according to the European Pharmacopeia method, allowing oil yield to be calculated as mL.100 g⁻¹ dry matter (DM). The essential oil's chemical composition was determined by gas chromatography-mass spectrometry methods (GC/MS). The ANOVA analysis indicated that the high ratio of NH₄ and NO₃ in the solution resulted in an increase on offshoots, chlorophyll content, and number of leaves, dry weight of root, and the ratio of root to shoot of peppermint, indicating that the uptake and assimilation of NH₄ has lower energy costs than uptake and assimilation of NO₃ on the herb performance. Similar results have been reported for two azalea cultivars and rose plant by other workers (8). Plants grown in the 40NH₄:60NO₃ solution led to improvement and an increase on the peppermint qualitative and quantitative growth indexes, e.g., wet and dry weight, numbers of leaves, and essential oil contents. This is in line with previous works of scientists. The compounds identified in oils of peppermint were 1,8-cineole, menthol, menthone, and menthofuran. The essential oil composition of *Mentha piperita* was affected by the NH₄/NO₃ ratios. The appropriate ammonium to nitrate (40:60) ratio increased the content of isomenthone, minthone, and minthohuran while the high amount of menthol and 1, 8-cincole components of essential oil was recorded in 0NH₄:100NO₃ and 80NH₄:20NO₃ ratios, respectively. Therefore, a combination of two forms of N in an appropriate ratio (40NH₄:60NO₃) appears to be beneficial to plant growth, yield, and quality of peppermint.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF GARLIC POWDER ON FATTENING PERFORMANCE IN DALAGH MALE LAMBS

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This study was conducted to evaluate effect of different levels of garlic powder (GP) on fattening performance of Dalagh male lambs. Twenty male lambs of Dalagh breed with 10 months of age and mean initial body weight of 31.03 ± 0.4 kg in a 91-days (7 day for adaptation and 84 day trial) were assigned randomly to four dietary treatments with five replicates per treatment as completely randomized design. Treatment include: 1- control treatment (without GP), 2- 5 gr GP/lamb/day, 3- 10 gr GP/lamb/day and 4- 15 gr GP/lamb/day. The lambs were fed individually ad libitum and. The results of this experiment indicated that different levels of garlic powder had no significant effect on dry matter intake, average daily gain weight and feed conversion ($P > 0.05$). In conclusion, in many in vitro studies were reported GP had positive effect to manipulation of rumen fermentation [1,2], but they had no potential to improve fattening performance of male lambs.

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DETERMINATION OF ANTIOXIDANT ACTIVITY OF SOME IRANIAN FERN SPECIES

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Many medicinal plants have great antioxidant potential. Antioxidants reduce the oxidative stress in cells and are therefore useful in the treatment of many human diseases, including cancer, cardiovascular diseases and inflammatory diseases [1]. Synthetic antioxidants such as butylated hydroxytoluene (BHT) and butylated hydroxyanisole (BHA) are currently used as food additives [2]. The literature reveals that natural antioxidants represent a potentially side effect-free alternative to synthetic antioxidants in the food processing industry and for use in preventive medicine. In this study 1,1-diphenyl-2-picrylhydrazyl (DPPH) scavenging activity of Methanolic extracts of aerial parts and rhizomes of five Iranian endemic Fern species were analyzed. IC₅₀ values ($\mu\text{g dry weight/ml}$) showed that the potential of DPPH scavenging of rhizomes were generally better than aerial parts. *Asplenium adiantum-nigra* and *Phyllitis scolopendrium* show moderate activity but *Polystich woronowi* shows good DPPH scavenging potential (IC₅₀ = $15.26 \pm 0.31 \mu\text{g dry weight/ml}$). *Dryoprons affinis* was very better (IC₅₀ = $4.60 \pm 0.11 \mu\text{g dry weight/ml}$). And rhizome of *Polytichium aceleatum* was very good (IC₅₀ < $1 \mu\text{g dry weight/ml}$). BHT was used as standard with IC₅₀ value of $13.7 \pm 0.75 \mu\text{g dry weight/ml}$.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



PHYTOCHEMICAL INVESTIGATION, DETERMINATION OF ANTIOXIDANT ACTIVITY, PHENOL AND FLAVONOID CONTENTS OF *SALVIA URMIENSIS* BUNGE

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The genus *Salvia* comprises over 1000 species. *Salvia* species are used as traditional medicines all around the world, possessing antibacterial, antioxidant, antidiabetic and antitumor properties [1, 2]. In the present study, *Salvia urmiensis* which is an endemic species of Iran has been phytochemically investigated for the first time and components of its acetone extract were analyzed. The column chromatography of the acetone extract with a gradient elution and monitoring with TLC, resulted in 31 fractions. Further separation and purification of the obtained fractions by smaller columns and also preparative TLC led to 8 pure compounds. Identification and structural elucidation of 4 purified compounds were performed using ¹H-NMR, ¹³C-NMR, DEPT90, DEPT135 and also X-ray crystallography. The obtained results showed the presence of β-sitosterol, corosolic acid and. A new ursanic triterpenoid was also identified which its structure was determined by X-ray crystallography. Moreover this study shows the antioxidant potential of acetone, methanol and hexane extracts of *Salvia urmiensis*. The results showed the highest total phenolic content in methanol extract (109.25 (GAE)/100 gr), the greatest total flavonoid content in acetone extract (170.5 mg quercetine equivalents/100 gr) and the highest radical scavenging effect in acetone extract with IC₅₀<1mg ml⁻¹.

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SATUREJA HORTENSIS L. GROWTH RESPONSE TO CHEMICAL AND BIOLOGICAL PHOSPHORUS

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To evaluate the effect of chemical and biological phosphorus on the growth and yield of *Satureja hortensis* L. a factorial experiment was conducted based on randomized complete block design with three replications at the field of Faculty of Agriculture, Urmia University, Urmia Iran in 2011. Treatments were chemical phosphorus (0, 50, 100 and 150 kg/ha as **Triple Super Phosphate** and biological phosphorus (0, 100, 200 and 300 g/ha of *Pseudomonas Putida* and *Basileus Lentus* Strain). Results of Analysis of Variance (ANOVA) showed the significant interaction effect between chemical and biological phosphorus on the yield of seed per plant, dry and fresh weight of aerial part for essential oil extraction per plant, biomass of a plant, the yield of essential oil per plant. The essential oil percentage was not affected by chemical and biological phosphorus. The highest weight of seed (2.175 g), fresh (69.98 g) and dry (7.569 g) weight drug (aerial part for essential oil extraction), total biomass (15.85 g) and essential oil (186 mg) per plant was obtained from 0 kg/ha of chemical phosphorus + 200 g/ha of biological phosphorus. The minimum amounts of above traits had below respect: seed weight (0.804 g/plant) in 50 kg/ha + 200 g/ha, fresh weight of drug (27.44 g/plant) in 50 kg/ha + 300 g/ha, dry weight of drug (2.915 g/plant) in 50 kg/ha + 200 g/ha, essential oil (75.50 mg/plant) in 50 kg/ha + 0 g/ha, total biomass (6.159 g/plant) in 50 kg/ha + 300 g/ha.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF *ZATARIA MULTIFLORA* BOISS. ESSENTIAL OIL ON *BACILLUS CEREUS* ATCC 11778

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Zataria multiflora Boiss. Is a favorite flavour natural growth plant belonging to the Lamiaceae family that geographically grows in Iran, Pakistan and Afghanistan. *Zataria* with vernacular name of Avishan Shirazi (in Iran) has traditional uses such as antiseptic, anesthetic and antispasmodic. This plant is extensively used as flavor ingredients in a wide variety of food in Iran. The main constituents of the essential oil of this plant are phenolic compounds such as Carvacrol and Thymol. In this study effect of different concentrations of *Zataria multiflora* Boiss. Essential oil (0, 0.005 , 0.015 and 0.03%) on *Bacillus cereus* ATCC 11778 (103 cfu / ml) , was evaluated using sterilized samples (16 bottles containing 80 ml barley soup) and 4 different incubating temperatures (8 , 10 , 15 and 25 °C) during 21 days .Data analysis was done using two way ANOVA . It was found that effect of different concentrations of essential oil on growth rate of *Bacillus cereus* ATCC 11778 was statistically significant (P < 0.01). The results suggested that *Zataria multiflora* Boiss. Essential oil can be considered as a natural preservative in some foods [1,2].

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ISOLATION AND HPLC-DAD CHARACTERIZATION OF MAJOR ANTIOXIDANT PIGMENTS IN FIVE SPECIMENS OF CYNOBACTERIA AND MICROALGAE

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Cyanobacteria and microalgae are rich sources of potentially bioactive compounds like carotenoids, fatty acids, proteins, polysaccharides, vitamins and phenolic compounds which exhibit antioxidant, anti-microbial, anti-inflammatory, hepatoprotective, immunomodulation and anti-cancer activities. The biosynthesis of pigments, like carotenoids play a major role in their antioxidant activity. These pigments could be used as food additives for their antioxidant activity and they could be also utilized as natural non-harmful colorants. In the present study, six phytochemical pigments containing β -carotene (provitamin A), lycopene, chlorophyll a, Xanthophylls (zeaxanthine and lutein that selectively accumulate in the macula of the retina of the eye) and C-phycocyanin were isolated from four specimens of cyanobacteria belonging to the genera *Anabaena*, *Nostoc* and *Spirulina* and one specimen of *Dunaliella*. Extraction of carotenoids and chlorophyll from freeze dried samples was performed using 90% acetone and C-phycocyanin was extracted in aqueous condition, all under dim light. HPLC is the ideal tool for identification and quantification of carotenoids and other photosynthetic pigments due to its speed, sensitivity, and specificity, precision and sample preservation. Analysis was performed by HPLC using isocratic elution and PDA detector and identifications were carried out using comparison of retention times and UV spectra of extracts with the standards. The results showed that these cyanobacteria and microalgae contain considerable content of bioactive pigments, mainly β -carotene, C-phycocyanin, chlorophyll and lycopene. The details of our findings would be further discussed in the conference.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF VARYING PHOSPHORUS AMOUNTS (BIOLOGICAL AND CHEMICAL) ON THE
PHOSPHOR USE EFFICIENCY OF *SATUREJA HORTENSIS*

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To evaluate the effect of chemical and biological phosphorus on phosphorus use efficiency for drug, essential oil and seed production of *Satureja hortensis*, a factorial experiment was conducted based on randomized complete block design with three replications in 2011. Treatments were chemical phosphorus (0, 50, 100 and 150 kg/ha as triple super phosphate) and biological phosphorus (0, 100, 200 and 300 g/ha of *Pseudomonas Putida* (Strain P13) and *Bacillus lentus* (Strain P5). Results of ANOVA showed the significant effect of chemical and biological phosphorus on the Chemical Phosphorus use efficiency for seed and essential oil production. There was a significant interaction effect between chemical and biological phosphorus on the yield of seed, aerial part for essential oil extraction per plant, essential oil, harvest index for seed production, chemical phosphorus use efficiency for drug (aerial part for essential oil extraction), and on the Biological Phosphorus use efficiency for seed production. However, there was the significant effect of biological nitrogen on the Biological Phosphorus use efficiency for drug and essential oil production. The highest yield of seed (725 kg/ha) was obtained from 0 kg/ha of chemical + 200 g/ha of biological phosphorus. This maximum seed yield was statistically the same with 0 kg/ha + 300 g/ha, 50 kg/ha + 100 g/ha, 100 kg/ha + 100 g/ha, and 150 kg/ha + 0-100 g/ha, of chemical and biological nitrogen, respectively. The highest (62 kg/ha) and the lowest (25 kg/ha) yield of essential oil were obtained from 0 kg/ha + 200 g/ha, and 50 kg/ha + 0 g/ha of chemical and biological phosphorus, respectively. The highest yield of aerial part for essential oil extraction (drug) (2523 kg/ha) belonged to 0 kg/ha of chemical + 200 g/ha of biological phosphorus. The highest (19.56 %) and lowest (7.70 %) amounts of harvest index for seed production, belonged to 0 kg/ha + 300 g/ha of chemical and biological phosphorus. The highest amount of biological phosphorus use efficiency (62222) was observed in 100 g/ha of *Pseudomonas Putida* and *Bacillus lentus* and 150 kg/ha chemical phosphorus. The highest (16810 and 482) and lowest (4375 and 122) biological phosphorus use efficiency for drug and essential oil production, were occurred at 100 and 300 g/ha of biological phosphorus. The maximum chemical phosphorus use efficiency for seed production was obtained at 50 kg/ha of chemical phosphorus (7.46) as well as 100 g/ha biological one (4.88). The highest chemical phosphorus use efficiency for drug (39.44) and essential oil (1.13) production were observed at 50 kg/ha of chemical + 100 g/ha of biological phosphorus.

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EFFECT OF AUXIN AND COPPER INTERACTION ON MORPHOLOGICAL PROPERTIES AND
ALTERATIONS OF COPPER CONCENTRATION ON SAFFRON

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Saffron (*Crocus sativus* L.) is a geophytic plant which is one of the most commonly known medicinal and aromatic plant species in the world. The stigma of saffron is used for dye, food or beverages additive and in the pharmacology industries. Little information is available on the saffron nutrition and hormonal properties [1-3]. The aim of this study was to evaluate the influence of different concentrations of copper and auxin on morphological properties of root and leaf of saffron. This study arranged as a factorial experiment in greenhouse condition and in hydroponic system. Copper was used in CuSO₄ form (0, 0.02, 0.1, 0.2 mgr/lit) and auxin in Naphthalene acetic acid (NAA) form (0, 1, 2 gr/lit). Results showed that interaction of NAA 1 gr/lit and CuSO₄ 0.1 mgr/lit increased root number, root and leaf dry and fresh weight. Furthermore, NAA 1 and 2 gr/lit decreased leaves bud number. Copper concentration of corm was increased in 0.2 mgr/lit CuSO₄. Development of roots and leaves growth can increase weight of daughter corms.

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16, 17 May 2012
Kish Island



IN VITRO GAS PRODUCTION KINETICS OF DIETS CONTAINING ANISE EXTRACT IN HOLSTEIN CATTLE

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The objective of this experiment was to investigate of effect anise extract on *in vitro* gas production of Holstein cow's diet. Rumen fluid was supplied from two fistulated steer that were fed a 40:60 concentrate: forage before the morning meal, and was added to the anaerobic mineral buffer solution (1:2 v/v). The experimental samples were a mixture of corn and soybean meal and 500 and 1000 μ l anise extract. Gas production was assessed by incubating approximately 300 mg experimental sample with 30 ml of rumen buffer mixture in 100 ml glass syringes [2]. Cumulative gas production data were fitted to the exponential equation, and organic matter digestibility (OMD) of experimental samples was calculated. The obtained data were subjected to analysis as a completely randomized design using the General Linear Model. Results indicated that diet containing anise extract caused a significant ($P < 0.05$) decrease degradation and gas production from fermentable fraction (lowest value was for diet treated with 1000 μ l anise extract, 45.5 ml) ($P < 0.05$). The greatest gas production after 24 hours incubation was for untreated diet ($P < 0.05$). Under the conditions of the present study, OMD of diet treated with 500 and 1000 μ l anise extract was the 177.2 and 169.1 g/kg OM, respectively) ($P < 0.05$). It is reported anethol is the main active component of anise and is responsible modification of rumen microbial fermentation and decrease methane and ammonia N production [1]. Therefore, the result of this study suggests that diet treated with 500 μ l anise extract under the experimental conditions has had the greatest effect on diet degradation of cattle.

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THE INFLUENCE OF TASCO (BROWN ALGAE) ON IN VITRO FERMENTATION OF RUMEN BACTERIA

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The aim of this study was to determine the effect of Tasco (brown algae of *Ascophyllum Nodosom*) extract on *in vitro* degradation of rumen bacteria. The samples were: untreated diet (40:60 forage to concentrate) and diet treated with 2 % Tasco. To preparing bacteria, rumen fluid was collected from two fistulated Holstein steers (400 \pm 12 Kg, BW) fed twice daily a diet containing 5.72 kg alfalfa hay and 3.08 kg concentrate mixture, then centrifuged (1000 rpm, 10 min) and added to fungicides solution (benomyle: 500 ppm/ml medium and metalaxyle: 10 mg/ml medium). The diets were incubated with 35 ml buffered rumen bacteria in 100 ml glass syringes, for 2, 4, 6, 8, 10, 12, 16, 24, 48, 72 and 96 h, at 39°C [1]. Gas production of samples was determined, in 4 replicates, and cumulative gas production data were fitted to the exponential equation. The obtained data analyzed as a completely randomized design using the general linear model procedure of SAS. The results indicated that the potential (b) and rate gas production (c) of diet treated with Tasco by rumen bacteria was higher than untreated diet (26.5 vs 23.2 ml and 0.006 vs 0.002 ml/h, respectively) ($P < 0.05$). Highest degradation and gas production at 24 and 72 h after incubation and cell wall degradation was for diet treated with Tasco (79, 96 ml, % 68 respectively) ($P < 0.05$). Researchers reported the using of Tasco improved fiber digestibility [2]. Therefore, *in vitro* rumen bacteria degradative activity for diet containing Tasco was higher than untreated diet.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE DETERMINATION OF NUTRITIVE VALUE OF *ACHILLEA MILLEFOLIUM* FORAGE IN RUMINANT

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The major objective of this study was to determine the nutritive value of *Achillea millefolium* forage in sheep by *in vitro* gas production technique. Rumen fluid was supplied from 2 fistulated sheep that were fed a 40:60 concentrate: forage (250 g concentrate, 550 g lucerne hay and 200 g wheat straw) before the morning meal, and was added to the anaerobic mineral buffer solution (1:2 v/v). Gas production was assessed by incubating approximately 300 mg experimental sample with 30 ml of rumen buffer mixture in 100 ml glass syringes [1]. Cumulative gas production data were fitted to the exponential equation. The values of cell wall degradability of *Achillea millefolium* forage were calculated. Results of the present study indicated that gas production from fermentable fraction and constant rate of *Achillea millefolium* forage was 115 ml and 0.02 ml/h. The content of cell wall degradability and gas production 48 h of *Achillea millefolium* forage was 37 % and 94 ml. Detailed survey of browse species is important to identify the better shrub species for ruminants, in terms of nutrient content and digestibility. On the base of the result, *Achillea millefolium* forage can be used in ruminant nutrition.

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THE *IN VITRO* DIGESTIBILITY OF DIETS TREATED WITH DIFFERENT LEVELS OF IRANIAN GARLIC

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The aim of this study was to determine the effect of different levels of Iranian garlic on *in vitro* digestibility of sheep diets. Rumen fluid was supplied from 2 fistulated sheep that were fed a 40:60 concentrate: forage (250 g concentrate, 550 g lucerne hay and 200 g wheat straw) before the morning meal, and was added to the anaerobic mineral buffer solution (1:2 v/v). The experimental samples were a mixture of lucerne hay, wheat straw, sugarcane pith, barley and 6 and 9 mg of DM Iranian garlic. *In vitro* digestibility of dry matter (DM) and natural detergent fiber (NDF) was measured by procedure of Tilley and Terry [1]. Rumen fluid was obtained from two Arabian sheep were fed a 40:60 concentrate: forage, then was mixed with McDougall buffer in a ratio 1:4, and incubated at 39 °C. After 48 h fermentation, 6 ml of HCL (20 %) and 5 ml pepsin solution (pepsin in HCl 0.1 N) were added and the incubated for 48 h simulating post-ruminal degradation. After incubation, the residual substrates of each tube were filtered and used to determine disappearance of DM and NDF. Data of disappearance of DM were analyzed as a completely randomized design using the general linear model procedure of SAS. The results indicated that 9 mg DM garlic caused a significant ($P < 0.05$) decrease *in vitro* digestibility of DM (79 vs 76, 76) and NDF (56 vs 54, 52) in compared with the other treatment ($P < 0.05$). Therefore, the results suggest that experimental diet treated with 9 mg DM garlic in this experiment has had the greatest effect on alteration ruminal gas production parameters.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



BIOINFORMATICS STUDY OF THE GENE ENCODING ISOPENTENYL DIPHOSPHATE ISOMERASE A KEY ENZYME FOR GENERATING ISOPRENOID DIVERSITY

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Isoprenoids comprise a family of >23 000 natural products, among them the precursors of cholesterol and taxol. There are several classes of essential molecules in this family, including sterols, carotenoids, dolichols, ubiquinones and prenylated proteins. Isoprenoid compounds are synthesized from two precursors: isopentenyl diphosphate and dimethylallyl diphosphate. Isopentenyl diphosphate isomerase is a key enzyme for generating isoprenoid diversity and is responsible for the isomerization of the carbon-carbon double bond of isopentenyl diphosphate to create the potent electrophile dimethylallyl diphosphate. In plants there are multiple copy *IPIs* genes. In this study six sequences of medicinal plants consisted of *Medicago sativa*, *Corylus avellana*, *Chrysanthemum morifolium*, *Daucus carota*, *Clarkia breweri* and *Arabidopsis thaliana*, have been analyzed. Multiple amino acid sequence alignment showed high homology between *IPIs* genes in plants. Also phylogenetic tree based on the amino acid sequences of this plant *IPIs*, revealed that this genes are derived from a common ancestors during evolution. Estimated of evolutionary divergence between sequences were highest and lowest respectively for *Daucus carota* vs *Arabidopsis thaliana* and *medicago sativa* vs *Corylus avellana*.

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THE EFFECT OF PEPPERMINT EXTRACT ON RUMEN DEGRADATION OF SUGARCANE PITH AND SUGARCANE TOP IN SHEEP

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The objective of this experiment was to investigate of effect of peppermint extract on degradation of sugarcane pith and sugarcane top in *in vitro* condition. Rumen fluid was supplied from two fistulated sheep were fed a 40:60 concentrate: forage (250 g concentrate, 550 g lucerne hay and 200 g wheat straw) in prior to the morning meal, and was added to the anaerobic mineral buffer solution (1:2 v/v). The experimental samples were sugarcane pith with 30 µl peppermint extract and sugarcane top with 30 µl peppermint extract. Gas production was assessed by incubating approximately 300 mg experimental sample (1.0 mm screen, triplicate) with 30 ml of rumen buffer mixture in 100 ml glass syringes. Gas production (ml) were recorded at 2, 4, 6, 8, 10, 12, 16, 24, 48, 72 and 96 h. Cumulative gas production data were fitted to the exponential equation $Y=b(1-e^{-ct})$. The values of organic matter digestibility (OMD) of experimental samples were calculated by the equation of Menke and Steingass [2]. Data of *in vitro* gas production and OMD were subjected to analysis as a completely randomized design using the General Linear Model. The result showed that gas production from fermentable fraction of sugarcane pith treated with 30 µl peppermint extract was more than sugarcane top treated with 30 µl peppermint extract (67.1 vs 43 ml) ($p<0.05$). Organic matter digestibility (OMD) of sugarcane pith treated with 30 µl peppermint extract was the highest value (184 vs 156 g/kg OM) ($p<0.05$). The highest gas production after 24 hours incubation was for sugarcane pith treated with 30 µl peppermint extract (36.3 vs 24.4 ml) ($p<0.05$). Essential oils (such as *Mentha piperita*) are used as alternative natural additive and modifier of rumenal fermentation [1]. Therefore, the results suggest that treated with 30 µl peppermint extract has had better effect on degradation and gas production parameters of sugarcane pith compared to sugarcane top.

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THE GAS PRODUCTION PARAMETERS OF SUGARCANE PITH TREATED WITH CINNAMON IN SHEEP

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The aim of this study was to determine the effect of cinnamon on degradation and gas production of steam treated sugarcane pith in sheep. Rumen fluid was supplied from 2 fistulated sheep that were fed a 40:60 concentrate: forage (250 g concentrate, 550 g lucerne hay and 200 g wheat straw) before the morning meal, and was added to the anaerobic mineral buffer solution (1:2 v/v). The experimental samples were steam treated sugarcane pith and sugarcane pith treated with steam and 1 and 2 mg of DM cinnamon. Gas production was assessed by incubating approximately 300 mg experimental sample with 30 ml of rumen buffer mixture in 100 ml glass syringes [1]. Cumulative gas production data were fitted to the exponential equation. The values of organic matter digestibility (OMD) of experimental samples were calculated. Data of *in vitro* gas production, and OMD were subjected to analysis as a completely randomized design using the General Linear Model. Results of the present study indicated that cinnamon caused a significant ($P < 0.05$) increase gas production from fermentable fraction of sugarcane pith and lowest was for steam treated sugarcane pith (42 ml) in compared with sugarcane pith treated with steam and 1 and 2 mg of DM cinnamon (62 and 72 ml, respectively) ($P < 0.05$). Under the conditions of the present study, OMD of sugarcane pith treated with steam and 2 mg of DM cinnamon was the greatest value (183 g/kg OM) ($P < 0.05$). The greatest gas production after 24 hours incubation was for sugarcane pith treated with steam and 2 mg of DM cinnamon ($P < 0.05$). Cinnam aldehyde, a natural chemical compound found in the bark of cinnamon trees, can alter rumen fermentation by some selected ruminal microbes [2]. Therefore, the results suggest that sugarcane pith treated with steam and 2 mg DM cinnamon has had the greatest effect on *in vitro* degradation of sugarcane pith.

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FACTORS IN PROMOTE THE MARKETING OF MEDICINAL PLANTS

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This study aimed to investigate the factors affecting the marketing of medicinal plants to promote the survey was conducted in the West of Iran. The study population included two groups are: 1) wholesalers and retailers 2) experts in all areas of medicinal plants. Two different questionnaires, data collection tools for wholesalers & retailers and are also experts. The results showed that the wholesalers and retailers of marketing promotion including: Facilitate interaction and communication between the components of marketing, enabling retailers to improve active sellers in the market, effective advertising, promotion and production equipment, production and sales management, product vendors to promote understanding of the fundamentals and principles of marketing, management, information management and marketing opportunities in the private sector and And views of experts, these factors include: Supporting producers, facilitate exchange of information management, marketing, product development, can influence the market, capable of adaptation studies - exploratory, identifying reliable sources of information, marketing assistance and capacity building of strategic decisions about technology marketing and advertising.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF IRRIGATION DISRUPTION AND BIOLOGICAL NITROGEN ON GROWTH AND FLOWER YIELD IN *CALENDULA OFFICINALIS* L.

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To evaluate effect of irrigation disruption and biological nitrogen on growth and yield of in *Calendula officinalis* L., an experiment was conducted as split plot at the research farm of Faculty of Agriculture of Urmia University (latitude 37.53 °N, 45.08 °E, and 1320m above sea level), Urmia-Iran in 2010. Treatments, included irrigation (irrigation disruption at first, second, third harvest and without disruption as control) as main plot and amount of biological nitrogen (0, 3, 6, and 9 l/ha of nitroxin) as sub plot, were arranged in randomized complete block design with three replications. Results showed the significant effect of irrigation disruption on the stem weight and of biological nitrogen on the stem weight and capitulate diameter. Interaction effect between irrigation and biological nitrogen on the leaf weight, stem length, the number of sub stem, biomass, seed yield, harvest index of seed, essential oil content, flower yield and essential oil yield in first harvest, second harvest, third harvest, fourth harvest, fifth harvest and total harvest were significant. The highest biomass (1298.5 g/m²) and seed yield (68.83 g/m²) were obtained from irrigation disruption at second and third harvest with 6 and 9 l/ha of nitroxin application, respectively. These results caused in the maximum (4.29 %) harvest index from irrigation disruption at third and second harvest with 9 l/ha of nitroxin application. The highest yield of dried flower, obtained from all harvests (2742.51 kg/ha) belonged to control treatment (without irrigation disruption) and 6l/ha of biological nitrogen. The highest yield of essential oil yield in year (24.49kg/ha) belonged to irrigation disruption at first harvest and 9l/ha of biological nitrogen. In general, biological nitrogen caused in the higher yield of *Calendula officinalis* in different amounts for production of dried flower and essential oil compared with control treatment.

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THE EFFECT OF DIFFERENT TREATMENTS ON SEED GERMINATION OF *SALVIA LERIIIFOLIA*

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Salvia Leriifolia (Nuruozak) is a medicinal plant belonged to *Lamiaceae* family and is endemic to Khorasan and Semnan provinces of Iran. The different pharmacological activities of this plant were evaluated in the recent years. The lower seed germination (25-45% for the best conditions) is one of the main problems for cultivation and domestication of *S. Leriifolia*. Therefore, to improve its germination, an experiment was conducted based on completely randomized design (CRD) with four replications and 21 treatments; including physical treatments (scratching and cracking the seed coat, splitting to half and removing the seed coat), chilling at 5 °C (for 36, 48, 72 and 96 hour) and chemical treatments (treated with Sulfuric acid for 15, 30, 45 and 60 minute, Gibberellic acid in 250, 500, 750 and 1000ppm, and Potassium nitrate in 0.1, 0.2, 0.4 and 0.6%). Results of Analysis of Variance (ANOVA) showed the significant effects of treatments on final germination percent, germination rate and germination index ($P \leq 0.001$). Means comparison showed that the highest germination percentage (96 %), germination rate (6.86 % per day) and germination index (10.221) were obtained from removing the seed coat. Despite of similarity in germination percent, rate and index along with our treatments, the number of groups were less in germination index than germination percent and rate. In general, physical treatments included removing the seed coat and splitting to half, had the highest germination percent, rate and index in *Salvia Leriifolia*. It seems that hard and impermeable seed is the main inhibition of germination in Nuruozak, because of a little effect of other than physical treatment.

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16, 17 May 2012
Kish Island



**SOME MORPHO-PHYSIOLOGICAL CHARACTERS OF LEAF IN *CALENDULA OFFICINALIS* L.
AFFECTED BY IRRIGATION DISRUPTION AND BIOLOGICAL NITROGEN**

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To evaluate effect of irrigation disruption on some physiological and morphological characters of *Calendula officinalis* L., an experiment was conducted as split plot at the research farm of faculty of agriculture urmia, University (latitude 37.53 °N, 45.08 °E, and 1320m above sea level) in 2010. Treatments, included irrigation (irrigation disruption at first, second, third harvest and without disruption as control) as main plot and amount of biological nitrogen (0, 3, 6, and 9 l/ha of nitroxin) as sub plot were arranged in randomized complete block design with three replications. Data analysis of variance showed the significant effect of irrigation disruption on area, length, width and weight of one leaf, specific leaf area (SLA) and Ratio of under/upper photosynthetic active radiation (PAR) of canopy. While the effect of biological nitrogen on area, and length of single leaf was significant. Interaction between irrigation and biological nitrogen on the ratio of under/upper photosynthetic active radiation of canopy and leaf area Index was significant, too. But, there were no significant effect of irrigation and nitroxin on the leaf proline content, leaf total soluble carbohydrate, chlorophyll *a*, *b*, total chlorophyll, carotenoid, the leaf relative water content, Chlorophyll index (SPAD). Means comparison indicated that the maximum single leaf area (582.11mm²), the widest leaf (0.99 cm) and the greatest single leaf dry weight (0.022g), were obtained from plants grown under irrigation disruption at first harvest. The minimum single leaf area (476.14mm²), the shortest leaf (3.72 cm) and the minimum leaf width (0.74cm) were obtained from irrigation disruption after third harvest. The longest leaf (4.38 cm) and maximum specific leaf area (33449.1mm²/g) belonged to irrigation disruption at second harvest and control treatment, and the smallest single leaf dry weight (0.018 g) and minimum specific leaf area (27465.2 mm²/g) was obtained from control treatment and irrigation disruption at first harvest, respectively. The highest single leaf area (841.829 mm²) and the longest leaf (5.66cm) belonged to 9 l/ha of nitroxin application, and the minimum single leaf area (298.95mm²) and the shortest leaf (2.67cm) belonged to control treatment.

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EVALUATION OF ANTIMICROBIAL EFFECT OF HYDRO-ALCOHOLIC EXTRACT OF *RUTA GRAVEOLENS* ON *ENTEROCOCCUS FECALIS*

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Enterococci are the second most cause of nosocomial infection. *Enterococcus fecalis* is responsible for often 90% of enterococci infections that usually are transferred by hand of health care workers and instruments. It can causes bacteremia, urinary system ulcer, biliary and endocarditis in adult and meningitis and septicemia in pediatrics. In order to adverse effects of chemical and synthetic drugs, it has made a positive attitude toward alternating herbal medicine instead of chemical ones. *Ruta graveolens* is an ancient herb in Iranian traditional medicine and other nations and has a wide therapeutic application for various diseases. Aim of this study has been effect of this herb on *enterococcus fecalis* growth. In this investigation we used standard *Enterococcus fecalis* PTCC-1237 which prepared from collection of bacteria and fungi, scientific and industrial research organization. Effect of hydro-alcoholic extract of *Ruta graveolens* on growth of bacteria has been evaluated by disc diffusion and serial dilution method and compared with eight prevalent antibiotics. Extract in range of 10 to 200 µg/µl didn't avoid from growth of bacteria in both MIC (Minimal Inhibitory Concentration) and MBC (Minimal Bactericidal Concentration) but bacteria was susceptible to 6 antibiotics. In this study preventive effect on growth of bacteria were not seen. It seems that this result is from high resistance of bacteria to antibiotics and it recommended more studies [1,2].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF HYDRO-ALCOHOLIC EXTRACT OF *TEUCRIUM POLIUM* ON CASTOR OIL-INDUCED DIARRHEA IN MALE RAT

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Diarrhea is one of the worldwide health problems and one of the most common causes of children's death. In the present experiment, effect of *Teucrium Polium* (TP) on castor oil-induced osmotic diarrhea was investigated. 30 male rats randomly were divided into 5 groups as follow: TP with doses of 100, 200 or 600 mg/kg; Diphenoxylate 5 mg/kg; and control (vehicle). One hour after orally receiving of drugs or vehicle (normal saline 10 ml/kg), each animal was given castor oil (2 ml/rat) by an oro-gastric catheter. Then the rat was placed in a separate cage and observed for 4 h defecation to determine fecal quality, frequency, and weight. Data were analyzed by ANOVA followed by Tukey tests and $p < 0.05$ was considered as significant difference. Both TP-600 (600 mg/kg) and Diphenoxylate attenuated weight loss percent, excretion's index and frequency of stool ($p < 0.001$). Compared to the control group, TP-600 also decreased water content of stool ($p < 0.01$). Extract of TP plant has the same effect as Diphenoxylate on attenuating osmotic diarrhea symptoms and also decreases fecal water content.

EXAMINE HOW THE SUPPLY OF MEDICINAL PLANTS IN GROCERY STORES IN THE CITY OF ISFAHAN

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The benefit conventional medicine of medicinal plants had a greater importance. Efficacy of medicinal plants depends on the preparation and delivery of drugs, which can affect the healing properties of plants. The purpose of this article was reviews how the supplies of medicinal plants in the grocery stores that are important centers for the sale of these plants. The study was a descriptive - analytical and a description - retrospective. In this project, in addition to reviewing records and monitoring questionnaires of grocery stores under the supervision of the Vice-Chancellor of treatment and drug and food and was evaluated item in the questionnaires a project with " a view to taking patients medicinal plants (Esfahan)". Information contained in medical records and questionnaires were entered in the computer program SPSS and classified and analyzed. There were cases in the period 1385-1389, and questionnaires were about 1389-1388 years. Attars in addition the sale of medicinal plants, which in many cases are not appropriate standards, involvement of people in treatment (approximately 70% of the records and inventory monitoring) and in some cases, misleading and have client. Regulations, the sale of herbal medicines are prohibited in-store grocery, while 26% of cases was observed and in data obtained 48% of patients were not aware of these issues and did not know the difference between medicinal plants and herbs to the place of supply. Many grocery stores had hand creams and capsules, dietary supplements, drugs addiction, drugs and obesity and impotence, which is handmade by a mixture of herbs and chemicals. Offering non-standard products as medicinal plant by Attar, causing mistrust of physicians and pharmacists, and some of the herbal products. Despite a history of herbal medicine, herbal medicine in the country is still peaceful. Because the distribution of medicinal plants has a large impact on the health of individuals, continuous surveillance is necessary on Sales.

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16, 17 May 2012
Kish Island



IN INTRODUCING THE MOST IMPORTANT MEDICINAL PLANTS IN MAZANDARAN
USED IN GOUTINESS

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The Gout is the one of types of the athirst linked with pain that cause of increase Uric acid in blood. One of the effects of increase Uric acid received extra Amino acid via foods. Extrauric acid in blood that change to crystal shape and deposit in joints and cause of rubefaction, inflation, to grow warm, pain and neuritis in one or same joints that it happened in toe, caloaneum, ankle, knee and elbow. Use of the home remedy is current in many countries in the word. For example used for the gout in Mazandaran, because of the natural agent and topographic effects to be found some the best medicine plants but because of lack one known and lack of awareness in this field that how to be use of these plants as one of the most important effect of revenue from them. Known and have enough awareness founding and introducing type of these plants can be cure for uplifting education used of this to remedy is widespread. Studding is necessary with a view to introducing the most important remedy plants. In this study for founding and introducing the effective to remedy the gout for used all people is in inspection and explanation some especial effects of this plant in order to known of chemical compounds and their body of these we explain plants and their names and scientific name and Persian name in Mazandaran in this research, at first with inspection the source of plants that are effective on gout illness and then by felor sources separated in Mazandaran province. The results show as that plants include 40 types of 40 species its belong to 27 colo that the most types related to [(Betula Alba=toos in Persian, (*Colechicum luteum*= soranjan), (*Salix* species=bid), (*Cichorium*= one the family of kasni), (*Articumlappal*=baba Adam), (*Phrsalis Alkehengi*= Arosakposhteparde), (*Fraxinus Excelsior*=zabangonjeshk), (*lippiacitroclora*=beh limo), (*Malvasylvestris*=Panirak), (*capparis spinosa*=koor), (*Trigonella foenum-graecum*=shanbalile), (*Nasfurtium officinale*=bolaghouti), (*Allium porrum*=tare), (*Cohlearia Armracea* = torshak), (*Corniculate oxalis*)] in the type that we use of them, leave in 18 type that plenty of these related to Labiatae Colowith plenty of to present and Rosaceae with 7.5% present. Liliaceae Colowith 5% plenty the result of this studding can be guide you and druggists and in inspection and remedy and use these for their want so.

EVALUATION OF ANTIOXIDANT ACTIVITY OF POMEGRANATE (*PUNICA GRANATUM*)

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Antioxidant is defined as any substance that when present at low concentrations compared with those of an oxidizable substrate, significantly delays or prevents oxidation of that substrate. Therefore a search for antioxidants of natural origin has attracted increasing attention. Pomegranate (*Punica granatum*) is one of the rich sources of bioactive compounds that antioxidant activity of its peel and juice has been reported. The present work was undertaken with the objective of evaluating the antioxidant activity of 10 cultivars of Iranian pomegranate peel and juice by FRAP assay. Analysis of variance results showed that there was a significant difference among pomegranate cultivars for peel and juice antioxidants. Results showed that peel of cv. Lamsari-e-Behshahr and Naderi-e-Badrood had the highest (705.50 mmol.100g⁻¹) and the lowest (225.17 mmol.100g⁻¹) antioxidant activity, respectively. The highest (419.33 mmol.100L⁻¹) and the lowest (157.33 mmol.100L⁻¹) antioxidant activity of fruit juice were observed in cv. Lamsari-e-Behshahr and Shishe-Kap, respectively. The mentioned results clearly indicate that peel extract contains more antioxidants than does the juice. As pomegranate peels are used as waste portion of fruits, therefore; these wastes can be reuse or consume for their medicinal values [1-3].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



COMPARISON ANALYSIS OF BIOCHEMICAL COMPOUND IN *GLYCYRRHIZA GLABRA* ROOTS FROM TWO LOCALITIES OF IRAN (BOJNOURD) AND AFGHANISTAN (HERATE)

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Liquorice (*Glycyrrhiza glabra* Family *Leguminosae*) is a very popular medicinal plant in the world. It, also known as licorice and sweetwood, is native to the Mediterranean and certain areas of Asia. Licorice rhizomes are used in herbal medicines for health effects and it contains more than 100 various useful compounds including phenolics and triterpene saponins (glycyrrizin). In this study, the content of some biochemical compounds (sugar, phenol and protein) important in pharmacy, food industry and economics were compared in *G. glabra* roots gathering from two localities of Iran (Bojnourd) and Afghanistan (Herat). Data showed that higher content of sugar (39.74 mg/g DW) was in Herat against Boujnourd (23.61). Bojnourd locality showed higher content of total phenolic compounds (167mg/g DW) than Herat (73.43). Protein content was higher in roots gathered from Herat (20.32mg/g DW) than Bojnourd, but this different was not significant. It seems that there is a correlated between the content of secondary metabolite production and climate condition. Therefore, environmental conditions are important factors in production of secondary metabolites in liquorice plants.

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A DOUBLE-BLIND, RANDOMISED AND PLACEBO-CONTROLLED STUDY TO EVALUATE SAFETY & EFFICACY OF HERBAL CREAM IN PATIENTS WITH MILD TO MODERATE ACNE VULGARIS.

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Acne is an important skin problem everyone faces at some time in their lives. It is most commonly seen on teenagers going through puberty because of the hormonal changes happening within the body. Unfortunately, many acne treatments create a multitude of complications, for example, flaking, redness and inflammation of the skin. It is expected that *Calendula officinalis*, *Rosa canina*, *Zataria multiflora-Boiss* and *Trigonella foennm graecum* consisting antimicrobial, anti-inflammatory and antioxidant effects and *Glycin max* by phytoestrogenic effect are resulted improvement inflammatory lesions in this disease. In the present study, efficacy and possible complications on acne vulgaris were compared with placebo to common-base, and it's clinical efficacy was evaluated by a random and double blind method. After Acne vulgaris diagnosis by dermatologist, patient content was taken. Account of inflammatory lesions and severity of disease were determined. Productions were distinguished by number codes and were delivered to patients. In second visit after two weeks, disease improves process and presence of possible complications was assessed. If necessary' the treatment was continued until end of four weeks, the patients were examined by dermatologist and lesions account were made again. Results analysis was done by SPSS and EXCEL softwares. Clinical trial results were illustrated that the herbal cream had more effects on papular and pustular lesions, disease severity and acne-induced inflammation as compared with placebo. A significant statistical difference was observed. Previous researches have shown that *Trigonella foenum graecum* is a good anti-inflammatory agent. Also, anti-oxidant and anti-microbial effect of the other above mentioned plants are reported. Regarding to expected results of using these herbs in production as compared with placebo, this cream has good efficacy in inflammatory lesions treatment without side effects.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



INCREASING GLAND NUMBER IN ST. JOHN'S WORT (*HYPERICUM PERFORATUM*) IN VITRO CULTURE BY DIFFERENT CONCENTRATION OF VITAMINS AND SUCROSE.

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St. John's wort (*Hypericum perforatum* L.) have some of the biological compounds such as hypericin and pseudohypericin that have pharmaceutical interest. They are localized in the small glandular structures located on flower petals, stamens, leaves and stems. In order to approach the highest of this glands, the seterill single node explants were cultured on MS medium with 8 combinations of MS vitamins (Thimine, Pyridoxine and Nicotinic Acid) and two concentrations of sucrose (30 and 40 g l⁻¹). ANOVA shown that number of dark and light glands were significantly influenced by vitamins combinations and sucrose interaction (p<0.05). The highest number of dark and light glands were obtained when explants were cultured in media included 40 g l⁻¹ and 30 g l⁻¹ sucrose with 100fold of MS vitamins respectively. Increasing the number of dark glands in media included 40 g l⁻¹ sucrose, correlated with high Nicotinic acid concentration and light glands number in 30 g l⁻¹ sucrose, correlated with high Thiamine and Pyridoxine concentration.

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ANTIMICROBIAL EFFECTS OF AQUEOUS, ETHANOLIC AND METHANOLIC EXTRACTS OF *EQUISETUM ARVENSE* L.

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In this research, antimicrobial activities of aqueous and alcoholic extracts of some organs of *Equisetum arvense* L. were investigated. Antimicrobial effects of ethanolic (80%), methanolic (80%) and aqueous extracts of sterile stem, fertile stem, leaves, branches, strobilus and rhizome organs of *Equisetum arvense* L. were investigated against some bacteria, for instance *Bacillus cereus*, *Staphylococcus (aureus, epidermis, saprophyticus)* and fungus "*Candida albicans*" were investigated using well method on nutrient agar medium. In antimicrobial research, the ethanolic extracts had more inhibitory effect against bacteria compared to methanolic extracts. Maximum antimicrobial effect was observed on *Bacillus cereus* and *Candida albicans*. The aqueous extracts showed no antimicrobial effects on studied microorganisms. Comparison of inhibitory zones diameter, revealed that alcoholic extracts were more effective on *Bacillus cereus* than *Staphylococcus* species. Ethanolic & methanolic extracts of different organs of *Equisetum arvense* L. have antimicrobial effects on *Staphylococcus* species & *Bacillus cereus*, and can be used as antimicrobial agent.

THE EFFECTS OF ELECTROMAGNETIC FIELD (EMF) ON VEGETATIVE ORGANS , POLLEN DEVELOPMENT, GERMINATION AND GROWTH OF POLLEN TUBE OF *GLYCINE MAX* L.

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In this research the effects of electromagnetic field (EMF) on vegetative organs ,pollen development , germination and growth of pollen tube of *Glycine max* L. were studied .Exposure to EMF was performed by a locally designed generator whose electrical power was provided by a 220 V , AC power supply .This system consist of one coil . Cylindrical in form ,made of PVC with 20 cm in diameter and length .The number of turns is 300 of copper wire .The results showed that in stem of treatment samples collenchymas layers were increased and formation of xylem tissues were more rapid. In structure of leaf, spongy parenchyma of mesophyll tissue was deformed and numbers of trachoma were increased under EMF treatment. In vegetative organs, under EMF conditions, we did not observe considerable changes, but there were some of delays in stages of development on these organs. The sizes of anthers were less than controls. The anther cell wall deformed and numbers of tetraspore decreased. Under treatment situation numbers of pollen were less than control samples and they were abnormal in shape. The results of pollen culture showed that in treatment samples, germination of pollen weredecreased and pollen tube became helicoidally form and looked short.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



SAFFRON AND ITS MANAGEMENT ON THE GLOBAL TRADE

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Today, trade is a global issue that definitely needs to follow world trade rules. Saffron trade in the us countries can be studied as a model in the process of global trade. Iran as the world's largest producer and exporter of saffron a significant proportion of the production, cultivation and the export value is allocated to this product. The process of strategic and targeted development of sustainable agriculture in the context of WTO agricultural trade can be optimized. Increasing production efficiency, knowledge transfer, and R&D spillovers depends on the expansion of agricultural trade, in addition to providing goal the WTO; the international competitiveness of products for export development will be possible. If the causes, problems and constraints affecting the export demand and supply will be identified, and then eliminate or reduce the export of actions take place, the possibility of optimizing the export market will be in the international arena. Given the name of plants such as saffron is identified with Iran so Thinkers and writers on this land is and relevant information to make it available to interested. And to learn those actual and potential characteristics of this valuable plant and also its various aspects of economic, employment, medication, etc. In this paper, it has been introduced to the saffron and its properties and saffron to the historical background and its economic importance is also discussed. It also posed challenges and effective strategies for maintaining and developing world markets offered.

EFFECTS OF AROMATIC WATER OF *SALIX AEGYPTIACA* L. AND ITS MAJOR COMPOUND, 1,4-DIMETHOXYBENZENE, ON LIPID PROFILE OF RABBITS

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Hyperlipidemia is associated with atherosclerosis and is a causal factor in cardiovascular diseases and stroke [1]. We previously reported that the essential oil of *Salix aegyptiaca* L. (SA) could not prevent from occurring of dyslipidemia in hypercholesterolemic rabbits. Also our previous investigation has identified 1,4-dimethoxybenzene (DMB) as a major compound of essential oil of SA [2]. Hence, the evaluation of lipid profile and atherogenic index were considered as safety pharmacology endpoints following intake of aromatic water (AW) of SA and DMB in normolipidemic rabbits in this study. DMB concentration in AW was measured by gas chromatography. This study was conducted in a period of 28 days. Here, forty eight rabbits were divided into six equal groups: negative control (NC) and positive control (PC) groups were daily gavaged with 10ml distilled water and simvastatin (0.6mg/kg), respectively; SA1 and SA3 groups were daily gavaged with 10ml AW contains 1mg/dl and 3mg/dl essential oil, respectively and DMB1 and DMB3 groups were daily gavaged with 10ml solution of 0.6mg/dl and 1.8mg/dl DMB, respectively. Blood samples were weekly collected and serum lipid parameters were surveyed. At the end of the study period, animals were killed after deeply anesthetized and were measured adipose tissues. Serum total cholesterol (TC) and LDL-C concentrations increased after 28 days in DMB groups compared with NC group. The SA groups decreased TC level similar to the simvastatin-treated group. DMB and AW intake did not positively modify HDL-C, VLDL-C and triglyceride levels compared to NC group. The atherogenic index level was higher in DMB3 group compared to NC and simvastatin-treated groups. The perifemoral fat mass was significantly increased in SA3 group in comparison to other groups. We found AW of *S. aegyptiaca* L. and its major compound, DMB, could not improve lipid profile of normolipidemic rabbits. In this context, DMB also exerted an array of abnormalities on lipid profile.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



OPTIMIZATION OF CALLUS CULTURE IN *CATHARANTHUS ROSEUS*

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The Madagascar periwinkle (*Catharanthus roseus*) is one of the most important medicinal and ornamental plants in the world that produces numerous indole alkaloids, several of which have an important pharmaceutical uses such as anti cancer compounds like vinblastine and vincristine [1,2]. In this investigation, periwinkle seeds, after sterilization were cultured on B₅ medium including 2g/l glutamic acid and %3 sucrose. Leaf and root segments of seedlings were cultured to medium containing various concentrations of NAA and 2,4-D accompanied with BAP and Kin for every 1 month. The samples were subcultured to increase the growth of callus. Parameters of callus growth as well as the growth in fresh and dry matter were investigated after 12 weeks. In this study, the best explants for callus culture and it's growth were leaf segments. Also, results show that the B₅ medium with 1.5 mg/l 2,4-D and 0.5 mg/l BAP were suitable for callus production.

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THE EFFECT OF SOLINITY STRESS ON CALLUSE OF LEAVES BRAGO OFFICINALIS BY TISSUE CULTURE

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With regard to the medical importance of *borago officinalis*, sub-clones, medical plants tissue culture techniques and isolated medical compounds from herbal calluses sometimes having the ability to produce Alkaloids, Anthocyanin and phenolic compounds for years and subsequently the cell culture that is very useful, it is attempted to culture the explants' pieces tissue of *Borago Officinalis* leaves and the callus induction rate of this plant is studied by different salinity treatments with repeated cultures. The current study has been done in order to evaluation of explants of the mentioned species for studying the callus induction percent of callus (laboratory of *Khorasan Razavi* agriculture and natural resources research center-1389). Determination of the most suitable hormonal treatment (between the used hormones) for callus formation followed by different salt concentrations effect (NaCl) on created calluses and selectivity of cells that have better growth in this tensions. Explants were researched in growth, index of callus, the effective culture parameters on formation and regeneration and settlement of callus subculture from the mentioned explants. It is used the ms for each one of the culture medium in this experiment. It is used two kinds of 2-4-d hormones (with the concentrations of 1 and 0.5 mg/l) and kinetin (with the concentration of 0.5 mg/l) with two levels of 1% and 5% respectively. The explants pieces including the leaves' parts cultured in the above mentioned mediums for creating callus, then the effect of different percent of salinity on the calluses resulted from the first experiment was studied and the salinity treatments of 0, 5, 15 and 30 (mg/l) were used with 1 mg/l of 2-4-d and 0.5 mg/l of kinetin having the 1% and 5% levels. The results of the evaluations demonstrated that the effect of callus' weight on the level of 5% is significant generally, so that the control pretreatment and the salinity treatment with the concentration of 5% mM had the most callus induction rate after being cultured, so that it showed a significant difference with the salinity treatment of 0.3 mM. The variance analysis of the growth index showed the best growth in the salinity concentration of 5% mM, so that the more concentration was followed by the decrease of growth index (the growth index of callus has decreased more than the control in the concentrations of 0.3 and 0.15 mM). The results of water percent variance analysis also showed that it is signified in the level of 5%, so that the salinity treatment with concentration of 0.15 mM has allocated the most percent of the water to itself. The control treatment has traversed its normal routine and the other treatments have increased their water absorption, so that their ability for absorbing the water have increased and saved more water in themselves by result of salinity tensions.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



THE INVESTIGATION OF AFFECTING FACTORS ON EXPORT SUPPLY OF PHARMACEUTICAL PLANTS (CASE STUDY OF FENNEL)

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Although statistical data show notable increase in export amount of pharmaceutical plants during last decades in Iran, but the trend of export was accompanied by fluctuation, especially about Fennel, which is one of the most important export medicinal plants and has great medic benefits. This study investigates short run and long run relationship between fennel export and important economical variable, For this purpose, an autoregressive distributed lag approach (ARDL) to cointegration is applied using annually time-series data from 1961 until 2009. Results showed that the exchange rate and the ratio of world export price to domestic export price have positive and statistically significant impacts on export value in both long and short-run, as if we enhance exchange rate or the export price ratio 1 percent, the export of fennel will increase, 1.8 and 1.5 percent respectively. Hence it's recommended to apply appropriate policy about exchange rate. Finally, according to estimated coefficient of Error Correction, in each period 50 percent of short run imbalance is adjusted for achieving long-run equilibrium.

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THE TRADITIONAL USE OF MEDICINAL PLANTS <GARMAB> TORBAT HEIDARI

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Medicinal plants constitute a significant proportion of the flora of Iran and Will play a major role in the composition of plant communities Some of them use some of the nutritional and medicinal purposes, are cosmetic.in line with this research in the area Garmab, Torbat hedariye Especially around the villages of the local Atbay Took place and the people of the region. After identification of medicinal plants in the region and identify plants using scientific resources and the people found And they use different resources and people of the region respectively. The research in the School of Agriculture martyr Alizadeh Garmab Vhnramvzan students took courses by medicinal plants. Based on the results of the study, 30 species of 20 families were identified. Of which 3 species of the family apiaceae lamiaceae 3 species of the family 5 species of the family Rosaceae 2 species of the family astraceae Two species of the family poaceae And the rest are from different families that are used in traditional medicine. Also worth noting is that the bulk chemical compositions in medicinal plants Area of essential oils, alkaloids, glycosides, tannins have been In the treatment of many diseases and have application in various industries such as pharmaceutical and chemical Many herbs and plants are based on available resources That can be used in the treatment of many diseases and The number of species of medicinal and therapeutic purposes by the villagers to arrive.

ANTICANCER LIGNANS CONTENT IN DIFFERENT ORGANS OF ENDEMIC *LINUM PERSICUM*

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Linum persicum is an endemic plant growing wild in Iran which have considerable amounts of lignans. These lignans are used to produce anticancer drugs such as, etoposide, etophose and teniopside [1]. In this study we investigated lignans content in different organs leaves, capsules, roots and stems. Podophyllotoxin content was higher in capsules and then inleaves, stems and roots respectively. Maximum lariciresinol was found in roots and capsules compared to leaves and stems. Pinoresinol was greater in capsulesthan in other organs investigated.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF DIFFERENT LEVELS OF GINGER MEDICINAL HERB ON PERFORMANCE IN BROILER CHICKS UNDER HEAT STRESS

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This study was carried out to evaluate the effect of different levels of powder and their associated essential oil of ginger (*Zingiber officinale*) on growth performance in broiler chicks under heat stress ($32\pm 2^{\circ}\text{C}$ for 8 h in day). A total of 224 day-old male broiler chicks (Cobb-500) were allotted into 4 dietary groups with 4 pens of 14 each, including basal diet with no supplement as control, diet containing 100-ppm vitamin E as positive control, diet containing 0.75 and 1.5 % of ginger root powder. The results indicated that at 22 days of age, group receiving 0.75% of ginger root powder experienced significant increase of body weight and body weight gain compared with the control group. There were no significant difference between experimental groups regarding body weight, feed intake and feed conversion ratio at 42 and 49 days of age. These results suggested that supplementation of ginger powder at used levels to broiler diet tended to increase growth rate, and so it can be replace antibiotics which have been banned to use as growth promoter in poultry feeds.

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SEED AND FRUIT FLAVONOIDS OF *RESEDA* (TOURN.) ET L. (RESEDACEAE) MEMBERS IN MARKAZI PROVINCE, IRAN

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Reseda (Tourn.) et L. from *Resedaceae* tribe is a genus in *Resedaceae* family with 1530 species and subspecies in the world and 14 species in Iran. Some flavonoid compounds have been reported from the *Reseda* genus. Flavonoids are as one set of the polyphenolic compounds among secondary metabolites in different organs of plants that are used in plant chemotaxonomy. They have basic role in pollination and life cycle of anthmophyllus plants and also their spreading abroad and survival. Phytochemical studies on 11 collected *Reseda* populations of 4 species (*R. lutea* L., *R. bungei* Boiss., *R. buhseana* Mull-Arg and *R. aucheri*) from different parts of Markazi Province, Iran area were done using 2-dimentional paper chromatography (2-DPC) and thin layer chromatography (TLC). Voucher specimens of each population were prepared for reference as herbarium vouchers. Results showed all of populations contain flavonoid sulphates and flavone C and C-O-glycosides. All of studied *R. lutea* populations had Rutin, quercetin, Luteolin, Isorhamnetin and Rhamnetin. While myricetin were found in *R. buhseana*, *R. bungei* species and *R. aucheri* where as *R. lutea* lack. The presence of luteolin, isorhamnetin and absence of myrectin in *R. lutea* are taxonomic characters for separation of the species from three other species (*R. buhseana*, *R. aucheri* and *R. bungei*).



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF *ALOE VERA* EXTRACT ON IMPROVEMENT OF BEDSORES IN PATIENTS HOSPITALIZED IN SONGHOR IMAM KHOMEINI HOSPITAL

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Bedsore is a common wound of hospital infections and complications, and a lot of patients are suffer from bedsore. Herbal plants have wide usage for treatment and management of bedsore, and Aloe vera has received much attention recently, and its local effects has been proven in several studies, but its oral usage and effects not clearly studied, so in this study we investigated the effect of *Aloe vera* extract on improvements of bedsore in hospitalized patients. Material and methods: we randomly choose 30 hospitalized patients who has bedsore in imam Khomeini hospital in 1390, regard to patients have underlying common treatments and have no improvements, treatment group compare with their self before the intervention. *Aloe vera* extract was ingested by patients in 100 mg per meal 3 times a day for a month, Data collection was conduct with interview, observation, and physician consult. Results: among 30 patients in the end of intervention, 19 patients (63%) have an improvement in bedsore compare to previous treatments and reducing hospitalized time compare to previous state, 7 patients (23%) shows no change and improvement compare to past and 4 patients (13%) faced with a deteriorating their wound status. Conclusion: results shows that consuming Aloe vera extract compare to other common bedsore treatment have a positive effect in wound status improvements and reducing hospitalized time in this patients.

EVALUATION OF EFFECT OF SOME MEDICINAL PLANTS ON GROWTH, BIOFILM FORMATION AND VIRULANCE FACTOR PRODUCTION OF *PSEUDOMONAS AERUGINOSA*

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Pseudomonas aeruginosa is an opportunistic pathogen which can cause different diseases in human, animal and plants. To cause disease this pathogen uses different virulence factors such as biofilm formation, pyocyanin and elastase production that their production is under control of Quorum sensing (QS). Extracts of six plants, cardamom, stingingassa, thyme, eucalyptus, cumin, and garlic, were examined in this study for their effects on growth and virulence factor production of *P. aeruginosa*. Avishan, Zireh, and okaliptoos caused a significant inhibition of growth on LB-agar plates and on liquid cultures. Additionally each plant presented a distinct effect on biofilm formation. Among them, Zireh and Okaliptoos could induce biofilm formation although in their presence no pyocyanin were detected in cultures. Our results indicated that in lower dosage of Zireh and Okaliptoos, although we observed a good effect on pyocyanin production and biofilm formation but this result are contradictory with QS regulated behaviors. Further researches are necessary to investigate the role of plant extracts on *P. aeruginosa* metabolites.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



COMPARISON THE EFFECT OF CHEMICAL DRUGS AND MEDICINAL HERBS ON AQUATICS ANESTHESIA

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Anesthesia in health and nurture of aquatics have various usages. One of them which can be mentioned is stress decrease. This stress can be caused by manipulating fishes during research activities, vaccination, egg-laying of matures, artificial reproduction operations, and etc. Chemical compounds are usually used in fisheries and aquaculture industry in Iran. One of the most widely used of these is Sulfonate Methane Threecaine (MS222 or Benzokaine Brand name) which has many side effects including environment problems caused by their use in water, impossibility of consuming anesthetized fishes for some time after anesthesia, being expensive, and individual health risks for people in fish reproducing farms. Therefore, it is essential to replace anesthetics with those with superior properties. With regard to enrichment of plant ecology in Iran and history of using native plants and medicinal herbs, economy, fewer side effects, and the results of research work inside and outside the country, it should be recommended to use medicinal plants in aquaculture industry and fish reproducing workshops. In recent years most works have been done on the effects and side effects of some plants including clove extract and powder, valerian, and shirazi thyme. Among these plants clove extract, having proper long effect and lack of toxicity or other side effects, has been introduced as alternative.

ALLELOPATHIC EFFECTS OF AQUEOUS EXTRACT OF SHOOT AND ROOT OF LICORICE (*GLYCYRRHIZA GLABRA* L.) AND PIGWEED (*AMARANTHUS RETROFLEXUS* L.) ON GERMINATION CHARACTERISTIC AND SEEDLING GROWTH OF CORN AND CHICKPEA

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In order to investigate the allelopathic effects of shoot and root aqueous extract of licorice (*Glycyrrhiza glabra* L.) and pigweed (*Amaranthus retroflexus* L.) on seed germination and seedling characteristic of Corn (*Zea mays* L.) and Chickpea (*Cicer arietinum* L.), a research was conducted based on completely randomized design with four replications. Treatments were four levels (25, 50, 75 and 100%) of leaf, stem, flower and root water extracts medicinal plants (*Glycyrrhiza glabra* L.) and (*Amaranthus retroflexus* L.) with distilled water as control. Results showed that there were allelopathic effects in Velvet flower and Glycyrrhizin, effect of aqueous extract of different plant parts on germination traits of maize and chickpea was not similar. Increasing the aqueous extract concentrations of separated Velvet flower and Glycyrrhizin plant parts significantly inhibited maize and chickpea percentage and rate of germination, length of radical and hypocotyls and increased time to 10 and 90% of germination. The degree of allelopathic effects of different Velvet flower and Glycyrrhizin plant parts can be classified in order of decreasing inhibition as follows: stem, leaf, flower and root, and between two medicinal plants, Glycyrrhizin indicated more allelopathic effects on germination traits [1, 2].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



INVESTIGATION THE ALLELOPATHIC EFFECTS OF DIFFERENT PARTS OF PENNYROYAL (*MENTHA PULEGIUM* L.) AND GARDEN SAGE (*SALVIA OFFICINALIS* L.) ON GERMINATION AND GROWTH CORN AND BEAN IN LABRATORY AND GREENHOUSE

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Some of drug crops have allelopathic effects and the effects on other plants are important. Especially in crop rotations; In this experiment allelopathic effects of aqueous extract of different parts (Roots, Stems, Leaves and Flowers) of (*Mentha Pulegium* L.) and (*Salvia officinalis* L.) on germination rate, root and shoot length of corn (Sc 704) and bean (Talash) was investigated. The experiment was conducted in completely randomized design with four replications in Laboratory, Dep, Of Agronomy, College of Agriculture, Shahid Bahonar University of Kerman, Iran. The treatments included control (distilled water), 25%, 50%, 75% and 100% of different parts of pennyroyal and Garden sage. In greenhouse experiment; the allelopathic effects the powder of different parts of pennyroyal and Garden sage was investigated on fresh and dry weight, plant height, Leaf chlorophyll content of corn and bean as factorial in completely randomized design, with 3 replications in the same years. There were significant differences between germination rate, root and shoot length of corn and bean with different concentration of aqueous extracts of different parts of pennyroyal and Garden sage, Mean observations showed that pennyroyal flower extract had highest growth inhibition on germination rate of corn and pennyroyal shoot extract had highest inhibition on germination rate of bean, root and shoot length of corn. In Garden sage Stem extract had highest growth inhibition on germination of corn and Flower extract had highest inhibition effect on germination of bean, root and shoot length of corn and bean. The greenhouse result showed that by applying the powder of pennyroyal and Garden sage to soil; fresh and dry weight, plant height and leaf chlorophyll content of corn and bean were reduced. Eventually; the allelopathic effects of these drug crops; showed be considered in rotations and other crops; these drug crops may be considered in producing organic herbicides; but more research is needed [1, 2].

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THE STUDY OF INHIBITION EFFECTS OF DIFFERENT PARTS OF LIQOURICE (*GLYCERRHIZA GLABRA* L.) AND PAGODATREE (*SOPHORA ALEUPECUROIDES* L.) MEDICINAL PLANTS RESIDUAL ON MAIZE AND BEAN IN GREENHOUSE

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In order to determine the allelopathic effects of Liquorice (*Glycerrhiza glabra* L.) and Pagodatree (*Sophora aleupecuroides* L.) on different traits of maize and bean an experiment was conducted in greenhouse at Shahid Bahonar University of Kerman, Iran. A factorial arrangement in randomized complete design with three replications was used for this experiment. Applied Treatment were including residue of stem, root, leaf and flower of Liquorice and Pagodatree, Material of each treatment were mixed with the soil of each pot which was control one plant. Measured traits were; height, dry and fresh weight and chlorophyll content and different residual parts of applied medicinal plants have different allelopathic effects. the results of Anova showed that the traits effected by applied treatment, the powder of stem, flower, root and leaf residual have significantly inhibition effects on maize and bean in comparison to control treatment. In maize; leaf chlorophyll content and plant height were as highly effected by different treatments ($p < 0.01$) and fresh and dry weight were significantly effected by the applied treatments ($p < 0.05$), while; In bean only fresh and dry weight and leaf chlorophyll content as highly effected by the applied treatments ($p < 0.01$) [1,2].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



MATHEMATICAL MODELING OF SALES BASED ON CUSTOMER SATISFACTION AND ACCORDING TO THE FUZZY DATA AND ANALYTIC HIERARCHY PROCESS (AHP)

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At present, satisfaction plays a significant role in competitive markets in the world. Therefore, the producer will lose his position if he ignores this very factor. Having used the Analytic Hierarchy Process (AHP), this research is trying to show that, in comparison to profit and expenses, satisfaction plays a significant role in medicinal herbs production. Then, it deals with acquiring of satisfaction averages according to fuzzy match. In the next step, modeling will take place in accordance with current conditions and fuzzy data. In this modeling satisfaction will be measured in proportion with production expenses and obtained profit in the competing markets. Having a look at the model and regarding the customers' preferences in terms of price, packaging, and quality which are the most important factors in medicinal herbs, the sales and profit amount can be maximized through planning in this industry. Consequently, the model will support the producer in decision making in order for him to design certain scenarios to attract the customers which ultimately causes the rise in satisfaction indicator and then in efficiency of the decisions.

ENHANCING EFFECT OF BRASSINOSTEROID ON ANTIOXIDATIVE CAPACITY OF *THYMUS PERSICUS* UNDER SALT STRESS

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Thymus persicus is one of important medicinal plants that cultivated widely and has numerous usages in medicine. In the other hand, brassinosteroids (BR) are new class of plant growth regulator compounds with unique biological effects on plants growth and development. The present study emphasize the role of BR (10^{-7} M) against oxidative stress in this plant that exposed to salt stress as NaCl+Na₂SO₄ (60mM). This experiment carried out in a randomized complete block design and plants grown hydroponically. Our results showed that in plants that treated only with salt, growth parameters and protein content reduced significantly, but lipid peroxidation and H₂O₂ content increased significantly. In plants that treated with BR and salt, lipid peroxidation and H₂O₂ content reduced significantly but some antioxidative compounds such as flavonoid and phenolic compound, ascorbic acid, glycinebetain content and superoxide dismutase enzyme (SOD) increased significantly. Growth in these plants is better than plants that treated only with salt. From this research we concluded that brassinosteroid increased antioxidative capacity in this plant against salt stress.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



PRODUCTION PLANNING APPROACH COMBINES HERBS WITH LINEAR PROGRAMMING
AND FUZZY THEORY

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Having information about efficient combination of agricultural products in each region is helpful for farmers in efficient allocation of limited resources to producing various products. This increase revenue, reduce costs and finally increase profit per unit of crop. Increase in the profitability of each unit plays a pivotal role in the development of agricultural units. Due to the fact that managers and planners are interested in programming multiple objectives simultaneously and also heavy dependency of producing agricultural production climatic conditions which makes it uncertain and risky, classical linear programming lost its efficiency in determining and designing unit of crop and therefore policy makers and planners turn to other methods to determine optimal cropping pattern. Fuzzy theory and fuzzy linear programming is one of the programming models which have been used frequently in recent years. Hence, programming medicinal plants with a combined approach involving linear programming and fuzzy theory is presented in this study. The main purpose is determining the optimal combination of medicinal plants production under the limited resources available. This leads to increase in profits and efficiency of production process and helps managers to make more effective decisions.

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MANAGEMENT OF BEDWETTING BASED ON IRANIAN TRADITIONAL MEDICINE

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Bedwetting is a medical term for urinating on your cloths during the day or urinating on your bed at night. There are two types of bed wetting: primary and secondary. In secondary form there is dry period followed by bed wetting. In US the prevalence of primary bed wetting reduces as age increases such that by the age of 4 the rate is 25% and by adulthood the rate declines to 2%.

The methods of bedwetting treatment in modern medicine are:

1. Limiting fluid consumption especially at night time
2. Use of Pharmaceuticals :
 - a. Imipramine: Much research suggests that efficacy of this treatment is 40% to 60% with a recurrence rate of 50%. The most important side effect of this drug is cardiac arrhythmia.
 - b. DDAVP: Success rate of this drug is 10% to 65% with recurrence rate of 80%. The most important side effect of this drug is water poisoning.

Considering the side effects of pharmaceuticals, the high rate of recurrence and public interest in traditional medicine, in this paper we have reviewed the treatment of bedwetting using Iranian traditional medicine literatures.

Based on Iranian traditional medicine bedwetting means urination in bed because of loosening of smooth muscles or due to small size bladder.

Treatment methods in traditional medicine include:

A) Non-pharmaceutical treatments

1. waking the patient a number of time for urination
2. Prevention of fluid and solid consumption close to bed time
3. Prevention of cold producing food consumption and encouraging intake of heat producing food.

B) Pharmaceutical treatments:

1. *Adiantum capillus veneris*
2. *Myrtus communis*
3. *Alpinia officinarum*
4. *Mentha logifolia*
5. *Boswellia* spp.
6. *Bunium persicum*

It is important to note the similarity between the traditional and modern medicine treatment methods of bedwetting in Iran. Also it has been proven that some of mentioned plants are effective in herbal medicine. We suggest that further studies are needed for the remaining plants.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



POMEGRANATE IMPACT ON HEALTH AND CURE DISEASE

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This article examines the effects of pomegranate on improved treatment of some diseases. The cumulative evidence suggests that pomegranate consumption possesses a diverse array of biological actions and may be helpful in the prevention of some inflammatory-mediated diseases including cancer. The pomegranate consumption reduced DAS28 in RA patients, and this effect could be related to the antioxidative property of pomegranates. Dietary supplementation with pomegranates may be a useful complementary strategy to attenuate clinical symptoms in RA patients.

The pomegranate fruit can be divided into at least three parts-seeds, peel, and juice. All these components have been studied for their antioxidant properties in a chemoprevention approach. Pomegranate extract (POMx) consumption has been shown to reduce the incidence and severity of collagen-induced arthritis in mice. The addition of POMx to serum from RA patients reduced free radical-induced lipid peroxidation by up to 25%.

FIRST EXPERIMENTS ON CULTIVATION OF *NEPETA BINALUDENSIS* JAMZAD – AN EXAMPLE OF DOMESTICATION OF A HIGHLY ENDANGERED MEDICINAL PLANT OF IRAN

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Nepeta binaludensis Jamzad is a rare and highly endangered ethnomedicinal plant of lamiaceae family which grows in Khorasan province in Northeast of Iran. A field experiment was conducted with biennial cultivation of the plant during 2006 and 2007 at research center of college of agriculture in Ferdowsi University of Mashhad, to assay its domestication performance. To evaluate the effects of agronomical conditions on its establishment, phenology, yield, morphological and phytochemical properties, different experiments including irrigation intervals (7, 14, 21 and 28 days), amounts of cow manure (10,20,30 and 40 ton/ha) and plant spacing (two row spacing of 50 and 75 cm and two inter-row spacing of 25 and 50 cm) were studied. Results indicated that this species can well establish and grow in agricultural system. The highest biomass, height, plant diameter, essential oil yield and Eucalyptol (1,8 Cineole) content were obtained at 7 days irrigation interval. The effects of cow manure on biomass, essential oil content and chemical components were not statistically significant. The whole growth period of this species was nearly 206-214 days which was equivalent to 2792.2-2826.2 GDD. Plant distances did not affect biomass and essential oil content significantly.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



REVIEW SOME ECOLOGICAL CHARACTERISTICS OF MEDICINAL PLANTS *THYMUS KOTSCHYANUS* DAMAVAND REGION – TAR BASIN

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Thymus kotschyanus which is related to Labiate family is one of valuable plant species that mainly grow in mountainous regions. Different species of this plant have worldwide distribution especially in mediterranean region habitats. It is essence is especially used in dring, cosmetics and thade industries and has strong antibacterial effects. Based on the researchs, this plant live in colonies and as a semi-palatable species its protein content is about 16.3% which varies with others associated species. Because of its effect in soil conservation, soil infiltration and large habitat areas it plays a major role in rangeland management and combat desertification . Annual production of this plant directly depends on precipitation , temperature and moisture. The reproduction of this species is in the form of seeds, wting or division root and its vegetal growth period starts in April, flowers appear in Late June while seeds riper around August. The results showed that Carvakrole (60.82- 82.05%) and Thymol (1.56-13.94%) are the most important substances in T. Kotschyanus. This study showed that essence of this species has high contant of the mentioned substances. To study soil characteristics, five siol samples were collected and then analyzed from each elevation nands which showed that these is no difference between soil properties in various elevation bands ($p < 0.01$). Only SAR and Na had significant differences in second and third elevation bands becase of high precipitation and stoniness of the region. Other studies parameters suchas production , frequncy, density, percentage and diameter of crown coves. And plant haight showed no significant differences while Pand Ph had significant and negative correlation differences between elevation bands.

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EFFECT OF PLANTING DENSITY ON DRUG YIELD AND CHEMICAL COMPOSITION OF ESSENTIAL OIL OF *SATUREJA KHUZISTANICA* JAMZAD.

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Satureja khuzistanica is a rich source of carvacrol that is distributed in the south of Lorestan province of Iran. As a part of domestication process, effect of planting density on production traits and chemical composition of essential oil of *Satureja khuzistanica* Jamzad was investigated. The experiment was conducted in 2010-2011 on the base of factorial experiment in RCBD with three replications. Main plots were consisted of the distance between rows in 3 levels of 60, 70, 80 cm and sub plots included plants spaces in levels of 25, 35, 45 cm. Results showed that the cultivation arrangements had significant effect on growth parameter and yield. The maximum drug yield (567.137gr/m²) and oil yield (19.23gr/m²) were obtained with cultivation arrangements of 60cm and also the maximum leaf yield (649.3gr/m²) and oil yield (22.62gr/m²) were obtained with cultivation arrangements of 25 cm. GC-MS analysis of the essential oils showed that carvacrol is present in high concentrations with no significant differences between different cultivation arrangements.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EVALUATION OF GENETIC DIVERSITY AMONG *SATUREJA MUTICA* POPULATIONS USING ISSR MARKERS

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Satureja mutica, a highly aromatic herb, has been distributed in north to north east of Iran. In the present study, the genetic variation among seven populations of *Satureja mutica* was investigated using ISSR molecular markers. Forthteen decamer ISSR primers produced 197 unique bands, of which 21 were monomorphic. The number of polymorphic bands per primer was varied from 9 to 19 with a mean of 12.57. Genetic distance measured by Nei's coefficient and a dendrogram was drawn based on genetic distances, applying the UPGMA clustering method. According to Nei's gene distance, among *S. mutica* populations, Keshanak and Garmabdasht populations showed maximum differences (0.14). Mean of F_{st} and N_m indexes which show gene flow among populations, were 0.28 and 0.75, respectively, indicating a low gene flow among all populations of *S. mutica*. The results of the present study showed that there is a great level of genetic variation among the Iranian natural populations of *S. mutica*, being suitable for future breeding programs.

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EFFECT OF BIOFERTILIZERS ON GROWTH, YIELD AND ESSENTIAL OIL CONTENT OF THYME (*THYMUS VULGARIS* L.) AND SAGE (*SALVIA OFFICINALIS* L.)

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To study the effect of bio-fertilizers on growth, yield and essential oil constituents of thyme (*Thymus vulgaris* L.) and Sage (*Salvia officinalis* L.) an experiment was conducted during two successive seasons of 2008-2009 and 2009-2010 at the research farm of Medicinal Plants and Drugs Research Institute of Shahid Beheshti University of Tehran, Iran. A randomized complete blocks design with three replications was used. The treatments consisted of commercial bio-fertilizers including N-fixer bacteria, phosphate solubilizing bacteria, mixed of these two bio-fertilizers and control (without fertilizer). Results of two years study showed that bio-fertilizers had no significant effect on growth, yield, essential oil percentage and chemical components of essential oil in both plants. The effect of plant age on all studied parameters was significant. The highest plant height, plant diameter, herb dry weight and essential oil yield were observed in two year old plants of both thyme and sage. The amounts of α -Thujone in sage and Thymol in thyme were considerably higher in two year old plants but the amount of Camphor in sage was not affected by age of plants. Results showed that three cuts in the second year of study can be achieved in both plants. The highest plant height, plant diameter and herb dry weight were achieved in spring cut but the highest essential oil content was obtained in summer cuts in both plants. Chemical constituents of essential oils were not affected by cutting time in both plants.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



APPROACHES OF SUSTAINABLE DEVELOPMENT OF MEDICINAL PLANTS IN IRAN WITH REGARD TO INTERNATIONAL COMPETITIVENESS AND JOB CREATION

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The importance of medicinal plants and Iranian traditional medicine and introducing of its important rules in achievements to national, regional and global goals, for realization of health, happiness, drug self sufficiency, job creation, economic development, food safety, conservation of plant genetic resources, and active participating in international markets is increasing day by day. This can be as advantages of the country in an efficient program offering an effective model for economic and environmental development. For creation of significant, targeted movement in organization of medicinal plants, to gain 3 % GDP, to gain a suitable position in global trade, and to create jobs for 250,000 people in this section, compilation of strategies, policies and comprehensive, executive, coordinate and coherent programs are the most important steps. In this way, a multidimensional program for correct management and use of advanced knowledge and technology, balanced development of sciences to wealth, demand and scientific based production, determination of export priorities, gaining of more contributions to targeted markets using SWOT method and analysis of failure reasons in the past, are presented as essential approaches for sustainable development of medicinal plants in Iran.

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THE MUTAGENIC AND ANTIMUTAGENIC ACTIVITY OF *LOVANDULA ANGOSTIFOLIA* AND *ELETTARIA CARDAMOMUM* ESSENTIAL OILS IN THE BACTERIAL REVERSE MUTATION ASSAY

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Essential oils from *Elettaria cordamomum* (cardamom oil) and *lavandula angostifolia* (Lavender oil) are used a lot in food and Drug Industry. Cardamom oil traditionally used as spice in food now is increasingly used as diuretic, sedative and for gastrointestinal disease. Lavender oil, traditionally used as an antiseptic agent, is now widely used as a relaxant, carminative, and sedative in aromatherapy. They both are used as flavouring additives in food and medical industry. It's very important to know their mutagenic potential. Meanwhile, the growth of cancer disease and insufficient chemical treatments are among main reasons for the antimutagenic effect of essential oils to be assessed.

In this study we investigated the mutagenic and antimutagenic activities of cardamom oil and lavender oil by the bacterial reverse mutation assay in *salmonella typhimurium* TA98 and TA100 strains with and without S9 (microsomal mutagenesis assay) for 7 dilutions of each essential oils. The mutagenicity effects were not seen in all dilutions of each essential oils, and antimutagenicity effect was seen in 0.40 and more concentration (mg/plate) of *Elettaria cordamomum* by the bacterial reverse mutation assay in *salmonella typhimurium* TA98 strains without S9. Assessment of genotoxic potential and identification of mutagenic components of essential oils has been considered widely after their increasing consumption rate, in order to investigate possible new activities of herbal essential oils like antimutagenic effect possibly leading to new and safer products. Although the antimutagenic activity of lavender oil is an interesting finding, further studies are required to identify the components responsible for its antimutagenic action.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF ESSENTIAL OIL AND EXTRACT OF SIX SPECIES OF SPEARMINT ON VERO, HELA, HEP2 CELL LINES BY MTT ASSAY AND ANTIBACTERIAL EFFECT

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Natural flavors essential oils are almost present in various food stuffs, cosmetic and pharmaceutical products. Safety assessment of these food additives should be seriously considered as long as their due wide applications are favorable. Natural flavors essential oils are widely used in various foods, cosmetic and pharmaceutical products. These kinds of additives are applied as colors, preservatives, aroma, antioxidant agents and tasting agents. In some cases, it may happen that the large. Spearmint essential oils are used as flavoring additives in food and medical industry. It's very important to know their safety, so this study planned. Methods: In this study, different Concentrations of six species of spearmint essential oils were tested in MTT assay with three cell line Vero, Hep2, Hela and antibacterial effect assayed by MIC method.

All six Essential oils and extracts were shown cytopathological effects on three cell lines in MTT assay in at least 2.5 microgram/ml concentrations and showed antibacterial effect in 0.97 microgram/ml concentrations(MIC). Conclusion: Based on obtained results, all studied essential oils and extracts may have cytopathologic effect in specific concentrations so suggested using of this compound should be performed with considering their proper concentration and more safety studies on them.

A STUDY ON ETIOLOGY AND DRUG RESISTANCE PATTERN OF VENTILATOR ASSOCIATED PNEUMONIA (VAP) IN IRANIAN 1000-BEDS TERTIARY CARE HOSPITAL AND EVALUATION OF EXTRACT OF *THYMUS VULGARIS*, *ZATARIA MULTIFLORA* AND *CINNAMOMUM BURMANNII* AGAINST ISOLATED ORGANISMS

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Ventilator associated pneumonia (VAP) is the most common nosocomial infection in ICUs and making up one-third of the total nosocomial infections. The aim of this study was to determine etiology and drug resistance pattern of most frequency isolates in an Iranian 1000-bed tertiary care hospital in Tehran. We also evaluated Antimicrobial activity of *Thymus vulgaris*, *Zataria multiflora* and *Cinnamomum burmannii* against VAP etiology agents. Tracheal Specimens were collected and processed according standard microbiological methods. Bacterial identification and susceptibility testing were performed using standard methods. We investigated antimicrobial effects of the three herbal extracts including *Thymus vulgaris*, *Zataria multiflora* and *Cinnamomum burmannii* and minimum Inhibitory concentration (MIC) of each extracted calculated against tested pathogens.

126 microorganisms were isolated from VAP cases. *Acinetobacter baumannii* with 46 (36.5%) isolates was the predominant organism followed by *Staphylococcus aureus* with 31 (24.6%). *Pseudomonas aeruginosa* were accounted 19 (15.7%) isolates. Our study showed antimicrobial activity all of three herbal extracts against microorganisms isolated from tracheal aspirates of patients with VAP. The extract of Cinnamon (*Cinnamomum burmannii*) was the most effective against *K. pneumoniae*, *P. aeruginosa* and *S. aureus*. The extract of Cinnamon had the MIC value <1-2 µg/ml for *P. aeruginosa* and <0.5-2 µg/ml for *K. pneumoniae* and *S. aureus*. The lowest MIC value of thymus was 0.0625 -1 µg/ml for *A. baumannii* and *Zataria multiflora* and Cinnamon extracts had 0.125-1 µg/ml and 0.0625 -2 µg/ml MIC for *A. baumannii*.

Our study revealed that *A. baumannii*, *S. aureus* and *P. aeruginosa* were the major etiological agents of VAP in our hospital. The majority isolates were resistant to routinely used antibiotics including third generation of cephalosporins. We also observed a high rate of MRSA among our isolates. All herbal extracts were effective against important nosocomial pathogens isolated from VAP cases.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECTS OF SAFFRON EXTRACT ON VERO, HELA, HEPII CELL LINES BY MTT ASSAY

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Today, in addition to the use of chemical compounds in food, pharmaceutical and cosmetics and health, the use of natural plant compounds in these industries has increased. Although it seems natural materials and chemical compounds, compared with side effects and cancer birth is less, but also using of them in different industries can be accompanied by side effects and toxicity. Saffron is one of the plants in medicine traditional food and cosmetics and health products are widely used. The aim of this study was to determine cytotoxicity and cell viability percent in vero, Hela and Hep2 cell lines.

Cytotoxicity and cell viability percent determined in vero, Hela and Hep2 cell lines while were exposed for serial dilution of saffron extract in 96well microplate by MTT assay. Then be readed (OD) optical density of this serial dilution with microplate reader. The result indicates that saffron extract with DMSO 10% as solvent has IC50 208,653,162 ppm and DMSO 10% has IC50 2%,7%,1% in Hep2,Hela and Vero cell lines. Therefore suggested that plant extracts such as saffron with suitable taste and flavor, when used as a side material in pharmaceutic, cosmetic and health, such as flavors or effective ingredient, they may have the side effects and Toxicity in some concentration.

STUDY OF ANTI-INFLAMMATORY EFFECTS OF *ORIGANUM VULGARE* EXTRACT ON RAT MIXED GLIAL CELL CULTURE

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Medicinal plants are the most important source of life saving drugs for the majority of the world's population. Plant secondary metabolites are economically important as drugs, fragrances, pigments, pesticides. *Origanum Vulgare L.* – Oregano, is a perennial plant that belongs to the Lamiaceae family. The aroma, flavor and pharmaceutical value of cultivated Oregano is a consequence of its essential oil which consists mostly of monoterpenes and sesquiterpenes[1]. Oregano extract obtained by Soxhlet extractor have been used to test anti-inflammatory effects on rat mixed glial cell. The main compounds present in extract of Oregano were thymol, rosmarinic acid and carvacrol[2]. Rosmarinic acid, an important phenolic compound, is commonly found in species of Lamiaceae. Rosmarinic acid has a number of interesting biological activities, e.g. antiviral, antibacterial, anti-inflammatory and antioxidant. HPLC analysis permitted the identification of thymol as the most anti-inflammatory compounds present in Oregano sample. The primary rat mixed glial cell culture for anti-inflammatory purposes were treated with respective doses of Oregano extraction.

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HPLC ANALYSIS OF PHENOLIC ACIDS IN AERIAL PARTS AND ROOT OF *THYMUS PERSICUS*

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A gradient elution method for analysis of 6 phenolic acids (gallic acid (GA), chlorogenic acid (CA), vanillic acid (VA), caffeic acid (AA), syringic acid (SA) and ferulic acid (FA)) in the aerial parts and root of *Thymus persicus* was developed by reversed-phase high performance liquid chromatography with Photo-diode array (PDA) detector. Separation was achieved on an Eclipse XDB-C18 (5µm, 150 mm×4.6 mm), Agilent (USA) in 25°C. The detection wavelengths of PDA were set at three selected positions: 254, 275 and 320 nm. The contents of phenolic acids was 40.98, 36.06, 31.87 µg/g dried weight plant in aerial parts for AA, CA and FA, respectively and 15.01, 7.98, 7.88 and 3.57 µg/g dried weight plant in root of *T. persicus* for AA, CA, FA and VA, respectively. GA, VA and SA in aerial parts and GA and SA in root of *T. persicus* were not detected. Relative standard deviation, RSD ranged from 0.01 to 3.04% [1].

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ANTIMICROBIAL ACTIVITY OF CYANOBACTERIA (BLUE – GREEN ALGAE) ISOLATED FROM HOT SPRING GENO

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Cyanobacteria (blue-green algae) are rich sources of structurally novel and biologically active metabolites. Recent studies indicate the presence of some bioactive compounds in the blue green algae which are shown to exhibit anticancer, antimicrobial, antifungal or anti-inflammatory and other pharmacological activities. The present study was aimed to collect and identify the cyanobacteria from hot spring, Geno, Bandar Abbas. Totally 21 species cyanobacteria were collected and cultured in BG-11 medium. Based on their growth characteristics, seven species namely *Oscillatoria subbrevis*, *O. tenuis*, *O. limnetica*, *O. angusta*, *O. articulate*, *Synechocystis aquatilis*, *Synechococcus cerdorum* were selected for the production of antimicrobial agents against five Gram-positive (*Bacillus subtilis*, *B. pumulis*, *Enterococcus faecalis*, *Staphylococcus aureus*, *S.epidermidis*) and three Gram-negative (*Escherichia coli*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*) bacteria, and two fungi (*Candida albicans* and *Saccharomyces cerevisiae*). The results of the antimicrobial activities of the methanol extracts exhibited high antimicrobial activity against some gram positive bacteria (*Bacillus subtilis* and *B. pumulis*), moderate activity against the some Gram negative organisms (*Escherichia coli*) and moderate activity against some fungi (*Candida albicans*).

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ESSENTIAL OIL COMPOSITION OF *TANACETUM CHILIOPHYLLUM* VAR. *OLIGOCEPHALUM* (ASTERACEAE) FROM IRAN

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The essential oil composition of *Tanacetum chiliophyllum* var. *oligocephalum*, belonging to Asteraceae from west Azerbaijan province of Iran was investigated for the first time. The essential oil was isolated by hydrodistillation from the aerial parts of plant. The oil with the yield of 0.5% (w/w) based on the dry weight of plant was analyzed by GC and GC-MS and identified. Twenty-seven components were identified representing 95.3% of the total oil. 1,8-Cineole (28.6%), camphor (11.8%), santolina alcohol (10.9%) and linalool (7.1%) were determined as major compounds.



EVALUATION CLINICAL EFFECTS OF AVENA SATIVA IN THE TREATMENT OF SKIN LESIONS DUE TO SULFUR MUSTARD

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Skin lesions due to sulfur mustard is the most complication of chemical veterans. Skin is the first organ that exposed to mustard gases and area of lesion is very wide. Chronic purities is one of the most prevalent complications in this patients. Avena sativa containing of silicon dioxide, poly phenol, monosaccharide, flavonoides and pectins that is the reasons for anti inflammatory effects of that. In this study we want to know the role of *Avena Sativa* in the treatment of skin inflammation and purities.

Current study was performed as a Randomized double blind clinical trial study. The number of patients was 25 in each three groups. Groups 1 was took *Avena Sativa*, group2 was took Bethametason and group3 placebo for 4 weeks. Patients was included based on inclusion criteria data was indicated that we have decrease in number of purities score in all three groups ($p=0.000$). decrease in pruritus score was significantly better in bethametason and *Avena sativa* compared to placebo ($p>0.05$). Patients compliance in *Avena Sativa* group was 68% and in placebo group was 52% and in Bethametason group was 72% that is significantly different. Quality of life in *Avena Sativa* and Placebo group and in *Avena Sativa* and Bethametason group was not significantly different and in Bethametason and placebo was significantly different. Quality of sleep in *Avena Sativa* and placebo was non significantly different and in *Avena Sativa* with placebo and Bethametason with placebo was significant different.

In overall in this study *Avena sativa* cream was significantly better than placebo in improvement of clinical manifestations but in compared to Bethametason was lower effects and we need more study with increase number of patients to evaluate better.

PLEUROTUS SPECIES AS A POTENTIAL SOURCE FOR STATINS

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It is known that hypercholesterolemia is a risk factor for cardiovascular diseases such as atherosclerosis and myocardial infarction. Edible mushrooms, like *pleurotus eryngii* contain a number of bioactive compounds associated with human health, including statins [1-2]. The present work was performed to investigate the production of lovastatin by fruiting body (FB) and mycelial liquid (ML) cultures of *pleurotus eryngii* mushrooms. After incubation period and filtration of the cultured medium, the filtrate was subjected to ethyl acetate extraction by shaking for 2 hours using a magnetic stirrer. In order to extract lovastatin from the FB, a mixture of 30/70 water/ethanol and an ultrasonic bath or magnetic stirrer were used [3]. TLC analysis showed the presence of lovastatin with Rf value of 0.46 (similar to the standard) in the FB extract using ultrasonic extraction method. Also, the ML culture extract showed a similar band in TLC analysis which was identical to that of the standard lovastatin. Crude samples were also analyzed using a UV spectrophotometer at 238 nm. Both standard lovastatin and crude samples showed a pick at 238nm. Further analysis of crude samples by HPLC/MS method is underway to confirm the presence of lovastatin in the crude samples [4].

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



MODELING OF DRYING *LAVANDULA OFFICINALIS* L. LEAVES

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Storage of agricultural crops after harvesting is important to keep quality and quantity of the dried materials in a good level, particularly for medicinal plants and herbs because of reduction of essential oils and changes of qualitative properties such as color, which both of them influence on the economical value of the products. Drying process of *Lavandula officinalis* L. leaves was studied and modeled in this investigation. Independent variables were temperature at three levels (40, 50 and 60°C), air velocity at two levels (0.5 and 1 m/s) and product depth at three levels (1, 2, and 3cm). The experiments were performed as factorial with complete random design in three replications. Seven drying models, namely Yagcioglu, modified Page, Page, Henderson and Pabis, Lewis, two-term and Verma, were examined to fit the data. The Page model was found as the best model with highest R² and lowest χ^2 , RMSE and P-values.

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MOISTURE ADSORPTION ISOTHERMS OF *LAVANDULA OFFICINALIS* L. FLOWERS AT THREE TEMPERATURES

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Lavander has been used as a medicinal plant and to treat several diseases. Knowledge of moisture adsorption isotherms is useful in storage condition. The equilibrium moisture content for *Lavandula officinalis* L. flowers were measured by using the gravimetric static method with water activity ranging from 11% to 85% and three temperatures of 30, 40 and 50°C. Five mathematical models (modified Henderson, modified Oswin, modified Halsey, modified Chung – Pfof and GAB equations) were used to fit the experimental data of adsorption. The modified Chung – Pfof model was found to be the best model for describing adsorption isotherms curves.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



MOISTURE SORPTION ISOTHERMS OF ROSEMARY (*ROSMARINUS OFFICINALIS* L.) FLOWERS AT THREE TEMPERATURES

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Rosmarinus officinalis L. is an important medicinal plant. Isotherms curve provide information useful for storage and drying processes. Isotherms show the relationship between air relative humidity and moisture content of the plant at constant temperature. In this research, moisture equilibrium data of *Rosmarinus officinalis* L. flowers by adsorption and desorption were determined at 30, 40 and 50°C and water activities ranging from 11% to 84% using the gravimetric static method. Five mathematical models (modified Henderson, modified Oswin, modified Halsey, modified Chung – Pfoest and GAB equations) were used to compare the experimental data. The modified Halsey and GAB models were determined to be the best models for describing rosemary desorption and adsorption isotherms curves, respectively on the other hand the hysteresis phenomenon was observed.

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ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS IN SOLTAN YAGHOOB PROTECTED AREA OF NAGHADEH (WEST AZARBAIJAN PROVINCE)

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In this paper, ethnobotanical importance and biodiversity of medicinal plants of Soltan Yaghoob protected area of Naghadeh (West Azarbaijan Province) were studied. Overall, 193 species belonging to 66 families and 51 genera were identified and their medicinal values, vernacular and scientific names were characterized. According to the life form results obtained, therophytes, hemicryptophytes, phanerophytes, cryptophytes and chameophytes constituted 33, 29, 16, 13 and 8 % of total species, respectively. The families of Asteraceae and Lamiaceae contained the most medicinal species with 23 and 24 medicinal and aromatic species, respectively. Percentage of medicinal plant species in Lamiaceae was found to be 100%, while in Poaceae and Caryophyllaceae it was 14 and 18 %, respectively. In conclusion, total number of endemic and rare plant species along with several medicinal species in the studied area confirmed its protective value.



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16, 17 May 2012
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THE EFFECT OF WILD PISTACHIO KERNEL OIL ON STABILITY OF CANOLA OIL DURING DEEP FAT FRYING

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The oxidative stability of canola oil (CAO) as affected by the bene kernel oil (BKO, 0.05-0.4%) and the unsaponifiable matters of BKO (UFB, 100 ppm) were compared to that of *tert*-butylhydroquinone (TBHQ, 100 ppm) during deep-fat frying of potatoes at 180 °C for 48 h. The degradation rate of oil samples was monitored by measurement of the rate of changes in acid value, conjugated diene values, carbonyl value, total polar compounds content, polar components, total tocopherols content, and color. The CAO stability increased at the levels of $\leq 0.1\%$ BKO whereas its higher levels caused pro-oxidant effects. Different physicochemical reaction during the frying process of CAO were retarded similarly in the presence of UFB or TBHQ, and even more in the presence of UFB in some cases (inhibitory effect on triglyceridic polymers and dimmers). The results showed that the thermo-oxidative reactions were affected by the antioxidative additives totally more than hydrolytic reactions during the frying of the oil blend. Also, the UFB showed a frying performance the same as that of the TBHQ or even better than that. Tocopherols were the major components of UFB. Moreover, the BKO contained noticeable amounts of Δ^5 - and Δ^7 - avenasterol.

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ANTIFUNJICIDE ACTIVITIES OF NIGELLA SATIVA ESSENTIAL OIL AND EXTRACTS AND IMAZALIL ON TWO VARIETY OF APPLE

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The essential oils of *Nigella Sativa* were obtained by distillations with water and vapor during 6 hours and the extract by methanol as solvent during 48 hours. They were sprayed on the Golden and Red Delicious apples at the rate of 0.1% and 0.2%. Imazalil was used (2000 p.p.m) as a chemical fungicide in comparison with natural antimicrobial extracts and the blank was a treatment without any chemical or natural preservative. This research is performed in randomized complete blocks in the test of four agent factorial and three replications. Total count, mold and yeast count, acidity, Vitamin C, brix, texture firmness, organoleptic, wastes percent and wet tests were done. Results showed that Golden Delicious variety had better microbial conditions, higher Brix, wet and vitamin C, harder texture, lower wastes and higher overall acceptance than Red Delicious. Storage during 6 months decreased the quality of apples. Essential oil and the extract of *nigella sativa* had less mold and yeast than Imazalil during 6 months storage. The essential oil and extract of *nigella sativa* can be used as substitution of Imazalil or other antimicrobials for delaying the deterioration of apples. [1-3].

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16, 17 May 2012
Kish Island



ANTIMICROBIAL ACTIVITY OF *PLEUROTUS ERYNGII* IN SUBMERGED CULTURE

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Due to the increasing resistance to the conventional antibiotics, finding new antimicrobial metabolites especially from natural resource is very crucial [1]. Basidiomycete edible mushrooms of the genus *pleurotus* are a new source of secondary metabolites, which are of medicinal interest for their antibacterial activity [2]. In the present study, mycelium of *pleurotus eryngii* was cultured by submerged liquid fermentation (SLF) technique. Following incubation and centrifugation of the culture medium, supernatant was separated, concentrated on the disk and tested for antibacterial activity against several standard microbial strains including *Escherichia coli*, *Bacillus subtilis*, *Candida albicans*, *Klebsiella pneumoniae*, *Staphylococcus aureus* and *Pseudomonas aeruginosa* [3]. The best antibacterial effect was observed against *Staphylococcus aureus* and *Bacillus subtilis* with inhibition diameters of 28mm and 26mm, respectively. To optimize the antibacterial activity, the effect of some production factors including pH, temperature and carbon source in culture medium were investigated. The results showed that the optimum conditions with the maximum antibacterial activity were using glucose as the best carbon source, 30 °C incubation temperature and the pH of 5.5.

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CHEMICAL COMPOSITION, ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF
PEUCEDANUM CHENUR ESSENTIAL OIL AND EXTRACTS

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The volatile constituents in the essential oil of *Peucedanum chenur*, growing wild in Kurdistan, Iran were investigated by capillary gas chromatography and gas chromatography–mass spectrometry for the first time. The major components of essential oil were α - pinene, β -caryophyllene and α - humulene. air-dried plant material was macerated successively in Hexane, Ethyl acetate, Methanol and Water for 3 days at room temperature.

Essential oil and different extracts were tested by different methods (DPPH, FRAP, ABTS, MIC and Disc Diffusion) for their *in vitro* antioxidant and antimicrobial activities. Polar extracts exhibited high antioxidant activity comparing to non polar extracts. Also the essential oil and different extracts indicated moderate to high antimicrobial activities.

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THE STUDY OF DISTRIBUTION AND PHENOLOGY OF *EREMOSTACHYS LACINIATA* IN THE WEST AZARBAYJAN PROVINCE, I.R.OF IRAN

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Human was thinking about using of the properties of medicinal plants from many years ago, and always, these plants were used in the improvement of common and important diseases. One of the medicinal plants that are grown in West Azarbayjan Province is *Eremostachys laciniata* L. that is from Labiateae family and native to Central Asian countries such as Iran, Armenia and Russia. The Rhizome of this plant has been used as a Topical Analgesic, Anti Inflammation, treatment of Bone fracture and tendon damages during long years. Although In Traditional medicine the root of this plant after drying, crushing and mixed with sheep tail as Ointment or Poultice. Since this plant had important role in medicine and soil erosion protection, Phonology and distribution of plant was studies in west Azarbayjan. In this study, first distribution of *Eremostachys laciniata* was Specified by using existing scientific references and field studies, then Valley of Shohda was selected for Phenological study. Then, 30 plants in terms of morphological and growth conditions were relatively the same conditions, were selected and marked. During the three years, visit was done every 15 days and the date of occurrence of plants life cycle phenomena (such as beginning of growth, vegetative growth, flowering, ripening and seed loss) were recorded on special forms. According to The field visit and studies was determined that this species was distributed in some areas of West Azarbayjan province, including the Valley of the shohada and Marmishu. Phonological studies of this species showed that growth of this species began in early May and its reproductive growth began in late summer in the next year and seed to reach full maturity in late November to early December. After the flowering stage and formation of seed, again vegetative growth of the plant began with the new branches of the base of plant.

IN VITRO CALLUS INDUCTION AND CELL SUSPENSION CULTURE ESTABLISHMENT FROM *WITHANIA COAGULANS* (STOCKS) DUNAL – AN IMPORTANT ANTICANCER MEDICINAL PLANT

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The genus *Withania* (Solanaceae) includes two medicinally important species, i.e., *W. somnifera* (L.) Dunal and *W. coagulans* (Stocks) Dunal, whose properties have been attributed to steroidal lactones named withanolides. In the present study, *in vitro* callus induction of *W. coagulans* was achieved from young leaf and internodal explants cultured on MS medium supplemented with different concentrations of auxins 2,4-D, NAA and IAA (1.0, 1.5, 2.0 and 2.5 mg/L) solely or in combination with BA (0.5 and 1.0 mg/L). High percentage of friable callus (96.0 and 85.4%) was obtained in leaf and internodal explants cultured on MS medium supplemented with 2.5 mg/l 2,4-D + 0.5 mg/l BA, respectively. The production callus biomass became stable with a growth index of 6 or more after the five subculture cycles. The best callus growth was obtained under the culture on MS medium containing 1.5 mg/L IAA and 0.5 mg/l BA which was selected for cell suspension culture establishment. The growth kinetics of *W. coagulans* cells followed a general growth pattern of sigmoid curve. The results could be used for further investigation on the biosynthesis of withanolides, especially withaferin A as an important anticancer compound in batch systems for this species.

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National Congress on Medicinal Plants
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Kish Island



INVESTIGATION OF EFFECT PLANT *SCROPHULARIA STRIATA* OF WOUND HEALING IN MICE

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Declining of the time in the wound healing treatment was noted by physician researcher for years. The various medicines has been used for acceleration of wound improvement procedure from past years. *Scrophularia striata* which belongs to Scrophulariaceae with 220 genus and 3000 species, was experimentally used for treating of several disease such as healing of cutaneous injury. The present study investigated the healing effect of this plant in full thickness wound of mice and comparison of this effect between several type of plant extract. The various part of plant were collected and dried and then grinded. Subsequently three different kind of extract such as alcoholic, hydro alcoholic and aquies forms were prepared. 35 male mice (NMRI) weighing 25-35 gr were used during the study. 2 circular wounds were created on the dorsal region of mice by 6 mm panches. After that, they were divided into 5 groups and placed in separated cage. The first group considered without treatment as control samples. In the second group Phenytoin cream 1% was used and in the other three groups each extract with contraction of 10% were used. All of the mice were treated 2 times daily and for tracking of the treatment process the area of the wound were documented by photography and measured by Image J software. Finally attained results were analyzed with Mann Withney Test by means of SPSS software.

Results showed that the average time of wound healing in the control group was 9 days after injury. And in the other groups were approximately resembled. Among all groups, those which were treated by hydroalcoholic extract demonstrated the lowest time of improvement with 6.14 days after injury. The postpone group in discarding of flocculation step, was control group with 9.75 days and the fastest group was Phenytoin cream 1% with 7.64 days. In the case of remind scare area also there was a significant difference between control group and test groups. There was a significant statistical difference ($p < 0/05$) between control group and all treated groups. Among all groups, those which were treated by hydro alcoholic extract showed the best result. Apparently the main reason of this positive effect is the stimulation of effective factor in wound healing procedure such as enhancement of fibroblast cells growth and/or increasing of collagen senthesis. Also anticeptic traits of the extract, prevent the wound to become infected. It seems that deferent result is depending on different extraction methods.

“TAKMID” IN IRANIAN TRADITIONAL MEDICINE

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Traditional medicine, which comprises ancient scientific experiences and cultural beliefs, has been enriched and developed over generations. Nowadays, a lot of indigenous methods applied by traditional practitioners to diagnose or treat various diseases have been phased out under the influence of modern medicine. As a result some aspects of ancient medical knowledge and practices have been faded away. This survey presents the findings of a research on a specific traditional medical practice called “Takmid”. The practical applications of the method, the combination of herbs used, and the approaches adopted towards the treatment in the method have been reviewed.

Analyzing authentic texts of Iran traditional medicine and ethno botanical investigation the study demonstrates that traditional practitioners applied various techniques of “Takmid” in treating cramping, stomach ache, Flatulence, flank pain and earache. Findings also show that “Takmid” is still practiced in different areas such as Lorestan, Fars and southern Iran. Considering that traditional treatment methods in Iran closely correlates with Iranians diet and palate, investigating the Iranian traditional medical methods and possible ways of integrating traditional and modern medicine is of special significance.



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HAEMOSTATIC EFFECTS OF SOME PLANT EXTRACTS

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Stop and avoid bleeding is always one of the main goals and wishes of medical sciences, and different pharmaceutical methods from chemical to traditional medicine and today's new compounds is used and innovated for this purpose. In this study we studied the effects of 9 medicinal plants which their anti-bleeding properties mentioned and reviewed in traditional medicine, and we will show their coagulation effect and finally the mechanism of clot formation will be discussed.

First we got the extraction of 9 herbs including snakeroot, chestnut tree, white willow, acacia Arabic wild, dragon's blood, pot marigold, incense, sarcocolla, and great-nettle by method of ethanol extraction (Maceration) and then these extracts with different concentrations 0.1, 0.2, 0.5 and 1 ml added to complete human blood without coagulation materials. After obtaining the clotting time (CT), we choose three herbs of snakeroot, Chestnut and Acacia Arabic wild and using the citrated plasma, calcium chloride and extract and with Factor assay test, Fibrinogen and also D-dimer measuring the clot making path has been verified. Three herbs of snakeroot, Chestnut and Acacia Arabic wild with the lowest clotting time have been chosen and again with citrated plasma in presence of calcium the clot has been made. After plasma centrifuging the II, IX and VIII factor will be decreased ($P < 0.05$), meanwhile the VII factor had remained unchanged ($P < 0.05$). The fibrinogen amount has decreased meaningfully ($P < 0.05$) and the amount of D-dimer has not a meaningful increasing ($P < 0.05$).

The extract of the three herbs especially the chestnut caused the consumption of internal paths factors (IX, VIII, and II) and the external path factors had no considerable increasing. This shows that these herb's extract will cause clotting via internal coagulation pathway.

ISOLATION AND CHARACTERIZATION OF *STEMPHYLIUM SEDICOLA* SBU-16 AS A NEW ENDOPHYTIC TAXOL PRODUCING FUNGUS FROM *TAXUS BACCATA* GROWN IN IRAN

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In the present study, a total of 25 endophytic fungi were successfully isolated from the inner bark of *Taxus baccata* grown in Iran by the aseptic technique. Genomic DNA was extracted from isolated endophytic fungi and subjected to polymerase chain reaction (PCR) analysis for the presence of the *Taxus* taxadiene synthase (*ts*) gene, which encodes the enzyme catalyzing the first committed step of taxol biosynthesis. Four out of 25 isolated endophytic fungi isolates showed PCR positive for the *ts* gene. Subsequently, taxol and 10-deacetyl baccatin III (10-DAB III) were extracted from culture filtrates and mycelia of the PCR positive isolates, and analyzed by high-performance liquid chromatography and mass spectrometry (HPLC/MS). The analysis showed that one isolate (SBU-16) produced taxol ($6.9 \pm 0.2 \mu\text{g l}^{-1}$) and its intermediate compound, 10-DAB III ($2.2 \pm 0.1 \mu\text{g l}^{-1}$). The isolate SBU-16 was identified as *Stemphylium sedicola* SBU-16, according to its morphological characteristics as well as the internal transcribed spacer (ITS) nuclear rDNA gene sequence analysis. Interestingly, this is the first report of the genus *Stemphylium* as a taxol-producing taxon.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EFFECT OF SALICYLIC ACID ON FLAVONOID CONTENT IN *MATRICARIA CHAMOMILLA* L.

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Matricaria chamomilla L. is one of the most popular herbs which have been used traditionally for medicinal purposes. It's multitherapeutic, cosmetic, and nutritional values have been established through years of traditional and scientific use and research. Salicylic acid (SA) is a well known signaling molecule in plants involved in many growth responses and induces plant tolerance to various biotic and abiotic stresses. Influence of different concentration of SA (1, 0.5, 0.25, 0.125 and 0mM) was studied in hydroponically- grown chamomile. High concentrations of SA were harmful to plants. Total flavonoids of 0.125Mm treated shoots were extracted in an ethanol:acetic acid (99:1) solution. The absorbance of extracts was determined spectrophotometrically at 270, 300 and 330 nm. Results showed a considerable increase of Flavonoids, with peak at the time of 48 h after the treatment. These results indicated that SA could enhance protein amounts and activity as well as enhancing the accumulation of phenylpropanoids.

INFLUENCE OF GROWTH REGULATORS AND ACTIVATED CHARCOAL ON CALLUS INDUCTION IN PERSIAN POPPY (*PAPAVER BRACTEATUM*).

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Persian poppy (*Papaver bracteatum*) is a perennial herbaceous belonging to *Papaveraceae*. *P. bracteatum* is an important commercial source of medicinal opiates and related compounds specially thebaine. Callus culture is a suitable method for proliferating cell masses those can produce abundant amounts of thebaine for application in medicinal goals. Presence of activated charcoal in tissue culture media is so important due to absorbing the phenolic compounds and prevention oxidative browning of explants. The aim of this study was to assess the effect of plant growth regulators and activated charcoal on callus induction from hypocotyls explants. The experiment was designed in completely randomized design – Factorial Treatment Structure. Two different concentration of active charcoal (2 and 4 g.l⁻¹) with 5 different concentrations of 2, 4-D (0, 1, 2, 3 and 5 mg.l⁻¹) were studied. Half strength MS medium used as basal media for all cultures. All the treatments had 3 replications. Results of Analysis of Variance showed the highest callus induction from hypocotyls explants was obtained in ½ MS medium containing 2g.l⁻¹ activated charcoal with 2 mg.l⁻¹ 2, 4-D. Application the 4 g.l⁻¹ of charcoal in all plant growth regulators concentrations induced lower callus percent rather than 2 g.l⁻¹ charcoal.

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NEW LABDANE DITERPENOIDS FROM *SALVIA LERIIFOLIA*

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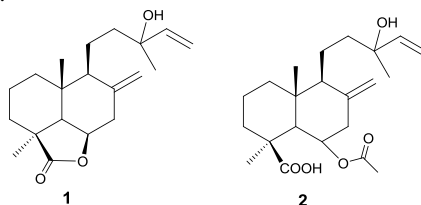
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The genus *Salvia* belongs to the Lamiaceae family and comprises numerous species that have been used since ancient times for the treatment of several disorders [1]. Diterpenoids, triterpenoids and polyphenols are very common in plants of this genus. Most *Salvia* species have been extensively investigated for their potential biological properties [2].

S. leriifolia Benth., that was introduced in the Iranian Flora in 1982, geographically grows in the southern and tropical regions of the Khorassan and Semnan provinces, Iran. Different pharmacological activities of this plant, such as the attenuation of morphine dependence, hypoglycemic, analgesic, and anti-inflammatory activities, and anticonvulsant, antiulcer, and antibacterial effects, were evaluated [3].

Herein, we report the isolation and structural elucidation of terpenoid constituents of *S. leriifolia*. Fractionation of a hexane extract of the aerial parts of this plant led to the isolation of two new labdane diterpenoids (**1**, **2**), together with several known compounds. Their structures have been established by high-field NMR techniques (¹H-¹H COSY, DEPT, HMQC, HMBC, NOESY), as well as HRESIMS.



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A NEW LABDANE DITERPENOIDS FROM *SALVIA REUTERANA*

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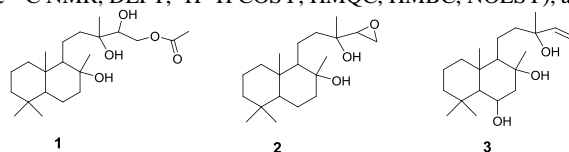
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The large *Salvia* genus (Lamiaceae) with over 900 species is found throughout most of the world and particularly in tropical and temperate regions [1]. The genus *Salvia* (Sage) is represented in Iran by 58 species, of which 17 are endemic [2]. *Salvia reuterana* Boiss. is a perennial herb which grows in the highlands of center of Iran. The plant popularly referred in Farsi as Mariam Goli Esfahani.

In Iran, different *Salvia* species are used as medicinal plants. For example, aerial parts of *Salvia officinalis* is used as hypoglycemic, *Salvia sclarea* as tonic, *Salvia macrosiphon* as antimicrobial, *Salvia aegyptica* as anti-inflammatory and *Salvia reuterana* as anti-anxiety herbal drugs [3]. Some *Salvia* species also possess antioxidative and psychoactive effects.

In the present work, we have undertaken a phytochemical investigation on the aerial parts of *Salvia reuterana*, which were collected from the northern hilly areas of Tehran. We report herein the isolation and structural elucidation of a new labdane diterpene (**1**), together with several known compounds such as diterpenoids (**2**, **3**). Their structures were established on the basis of extensive spectroscopic data, including ¹H & ¹³C NMR, DEPT, ¹H-¹H COSY, HMQC, HMBC, NOESY), as well as HRESIMS.



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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



A NEW SESTERTERPENOID FROM *SALVIA MIRZAYANII*

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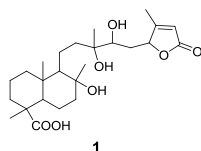
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The *Salvia* species are important medicinal and culinary plants, and they have been the subject of numerous chemical and biological studies. Apart from their common constituents (terpenoids and flavonoids) and their interesting biological activities, the genus *Salvia* is unusual, as it is the only genus in the Lamiaceae that produces sesterterpenes [1]. In contrast to di- and triterpenoids, sesterterpenoids are rare in nature and have been reported most commonly in marine sponges and algae. Among *Salvia* species, these rare and interesting compounds were isolated and identified for the first time from Iranian species, and this prompted us to undertake a systematic phytochemical investigation of members of this genus.

Salvia mirzayanii grows in the southern parts of Iran and is known as “Mour-talkh”. In the local popular folk medicine, it is used for the treatment of diarrhea, stomach ache, headache, hypercholesterolemia and diabetes, and also for wound healing [2].

As a part of an ongoing research program aimed at the isolation, structural characterization, and pharmacological evaluation of bioactive secondary metabolites from plants [3], we started the phytochemical analysis of *Salvia mirzayanii*. Our studies led to the isolation of a new sesterterpene lactone (**1**), together with several known compounds, whose structures were secured by means of spectroscopy as well as mass spectrometry analyses.



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PHENOLOGICAL DETERMINATION OF ESSENTIAL OIL CONTENT AND COMPOSITION IN
AREAL PARTS OF *AGASTACHE FOENICULUM*

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Agastache foeniculum is a medicinal and spice plant belonging to Lamiaceae family. The oil has been found to possess antimicrobial and anti-fungal properties, and it is also used in flavoring liqueurs and cosmetic industries. The effect of harvest time in three different phenological stages including: before flowering, full flowering and fruit set on essential oil content and composition of *Agastache foeniculum* were studied. The experiment was conducted under the field condition at Zardband region in the north of Tehran. Oils were extracted by hydrodistillation of vegetative aerial parts using Clevenger-type apparatus and were analysed by GC and GC-MS. Harvest time had a significant effect on essential oil content. According to the results, maximum amount of essential oil content (1.4%) was extracted at full flowering stage. This result is in agreement with results of studies on other aromatic plants in lamiaceae family [1, 2]. GC and GC-MS analyses revealed that the main identified component of essential oil in every three stages was methyl chavicol that was reached to highest amount at full flowering stage (95.56%). Different harvest times resulted in quantitative differences in proportion of the various components.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



DETERMINATION FATTY ACIDS IN *MORINGA PEREGRINA* OIL FROM DIFFERENT LOCATION IN SISTAN AND BALOCHESTAN PROVINCE

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Moringa peregrine is one of the species which growing in tropics area and its distribution on south eastern of the country in Hormozghan and Sistan and Balochestan provinces. *Moringa peregrine* is a desert shrub that can grow in areas with little rainfall and it have cost in food, pharmaceutical, environmental, industrial and economic values. The purpose of this study, determination of fatty acids in *Moringa peregrina* seed oil from different location in Sistan and Balochestan province in 2009. Five samples were collected from five natural research stations . samples extracted by solvent and cold press for yield content in seed used Soxhlet method. Oil content obtained from Tong Fonoj station were 54.6%, from Keneshky station were 50.4%, from Bent station were 52.4%, from Begaband station were 53.2%, from Dorahy Chanf were 53.6% respectively. The results show the amount of fatty acids, were oleic acid from 71.5 upto 74%, palmitic acid were from 12.6 upto 14.7%, *cis*-oleic acid were from 3.6 upto 4.5%, palmitoleic acid were from 3.3 upto 4.7%, stearic acid were from 1.9 upto 2.4%, Behenic acid were from 0.9 upto 1.5%, gadoleic acid were from 0.4 upto 10.9% and Arachidonic acid were from 0.4 upto 1.3% are variable.

Over 90 percent of oil consumed in the country comes from abroad and with review of research into the causes and rates of fatty acids in *Moringa peregrina* seed with a wide food consumption can be as a new source for the production Vegetable oil.

CHEMICAL COMPOSITION ESSENTIAL OIL AND HYPRICINE CONTENT OF NINE *HYPERICUM* SPECIES AND STUDY OF HYPRICINE CONTENT BY HPLC

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Hypericum genus is one of the most important medicinal plants which contains 17 species in Iran. There are three species of shrub endemic to Iran. In this research, nine species of *Hypericum* collected on June and August 2010 were study. For Hypericine content 1 gram of plant were extracted by two steps, chloroform extraction and methanol extraction by Soxhlet method , and then extracted separated and measured by HPLC apparatus, were mobile phase were methanol 68%, ethyl acetate 20% and sodium hydrosulphate (0.1 M) 12% and stationary phase C18, and UV detector which was set on at 590 nm. Hypericine content in flowers, leaves and stems in *H. androsaemum* L. Generally were lack of the composition and in *H. apricum* (in flowers 613 ppm and leaves 50 ppm), in *H. armenum* (flower 25.8 ppm), in *H. asperulum* (in flower 245 ppm, leaves 40 ppm, and stems 25.8 ppm), in *H. hirsutum* L. (flower 70 ppm), in *H. linarioides* (flower 70 ppm), in *H. tetrapterum* (flowers 82.5 ppm, leaves 138.8 ppm, and stem 12.8 ppm), and in *H. vermiculare* (flowers 45.8 ppm), in *H. perforatum* (flowers 1237 ppm, leaf 281 ppm, stem 25 ppm) were obtained.



EVALUATION OF THE ANTIMICROBIAL AND CYTOTOXIC ACTIVITY OF METHANOL
EXTRACTS FROM STEMS AND FRUITS OF *CALLIGONUM COMOSUM* **L`HER.**

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Antimicrobial and cytotoxic activity of methanol extracts of stems and fruits of *Calligonum comosum* were estimated in this study. Antimicrobial activity measurement by disc diffusion method using 9 bacterial and 2 fungal strains led to the determination of stem extract growth inhibition zones of 22 mm for *S. epidermidis*, 10 mm for *A. brasiliensis* and *K. pneumoniae* while those of fruit extract were 19 mm for *K. pneumoniae*, 11 mm for *P. vulgaris* and *S. epidermidis*. Rifampin, Gentamicin and Nystatin were used as positive controls with inhibition zones of 40 mm, 35 mm and NA for *S. epidermidis*, 0 mm, 23 mm and NA for *A. brasiliensis*, 7 mm, 22 mm and NA for *K. pneumoniae* and 10 mm, 23 mm and NA for *P. vulgaris* respectively. The plant was also screened for its cytotoxic activity using brine shrimp lethality test but all LC₅₀ values obtained were above 1 mg/ml.

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EVALUATION OF THE ANTIMICROBIAL ACTIVITY OF THE ROOT
EXTRACT FROM *DOREMA AMMONIACUM* D. DON.
FROM KASHAN AREA

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Antimicrobial activity of the root methanol extract of *Dorema ammoniacum* was evaluated against eight Gram-positive and Gram-negative bacteria (*Bacillus subtilis*, *Proteus vulgaris*, *Shigella dysenteriae*, *Staphylococcus epidermidis*, *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*) and three fungi (*Candida albicans*, *Aspergillus brasiliensis* and *Aspergillus niger*). Disc diffusion and minimum inhibitory concentration (MIC) results indicated moderate to high antimicrobial activity for the plant roots especially against *B. subtilis*, *S. epidermidis* and *S. aureus* with MIC values of 0.0312 mg/ml, 0.125 mg/ml and 0.5 mg/ml respectively.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



COMPARISON OF THE ESSENTIAL OILS CHEMICAL COMPOSITIONS FROM THE AERIAL PARTS OF FRESH AND DRIED *CALLIGONUM COMOSUM* L'HER.

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This study compares the chemical compositions of the essential oils obtained from fresh and dried aerial parts of *Calligonum comosum* L'Her [1] using hydrodistillation extraction method. GC and GC/MS analysis of the essential oils [2-4] from fresh and dried plant aerial parts led to the identification of 21 and 22 components making 98% and 95% of these oils, respectively. The main constituents in the oil of fresh plant material were Piperitenone, *n*-Tricosane, Linoleic acid ethyl ester, Hexadecanoic acid, Heneicosane, and palmitic acid constituting 60.01% of it while the oil of dry plant material was mainly consisted of linoleic acid, methyl *p*-anisate, *n*-hexadecanoic acid, methyl 7,13,15-abietatrienoate, Benzeneethanol, Geraniol and Linoleic acid totally making up to 85.71% of it.

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EVALUATION OF THE ANTIOXIDANT ACTIVITY OF METHANOL EXTRACT OF AERIAL PARTS OF *CALLIGONUM COMOSUM* L'HER.

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The present study report the antioxidant properties of total methanol extract from two distinct samples one obtained from flowering and the other obtained from fruit containing aerial parts of *Calligonum comosum* [1] The samples were screened for their antioxidant activities using 2,2-diphenyl-1-picryl hydrazyl (DPPH) stable free radical and β -carotene-linoleic acid assay methods [2- 4]. Both samples showed considerable activity in DPPH assay with IC₅₀ values of 19.31 \pm 0.25 μ g/ml and 46.81 \pm 0.35 μ g/ml, respectively. In the β -carotene-linoleic acid test both samples were again almost equipotent and their inhibition percentages were 55.45% and 63.08% respectively. Total phenolic compounds contents of methanol extracts of the samples were also estimated as 107 μ g/mg and 84 μ g/mg respectively.

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EVALUATION OF THE *IN VITRO* ANTIOXIDANT ACTIVITY OF THE FRUIT OF *DOREMAAMMONIACUMD.DON*.

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The present study was conducted to evaluate the *in vitro* antioxidant properties of total methanol extract from fruit of *Doremaammoniacum*. The antioxidative potential of the samples was evaluated using two different methods: inhibition of 2,2-diphenyl-1-picryl hydrazyl (DPPH) stable free radical and β -carotene-linoleic acid assay (1,2). The plant methanol extract showed moderate activity in both assays with an IC_{50} value of 154 ± 0.03 μ g/ml in DPPH assay and 60.7% inhibition percentage in the β -carotene/linoleic acid assay. Synthetic standard antioxidant butylated hydroxy toluene (BHT) was used as positive control in these assays and 17.06 ± 0.53 μ g/ml and 98.1% were recorded as its IC_{50} value and inhibition percentage in these tests, respectively (3,4). Total phenolic compounds content of the plant extract was also estimated as 85.41 μ g/mg showing a direct relationship between antioxidant activity and phenolic compounds contents.

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COMPARISON OF THE ESSENTIAL OILS CHEMICAL COMPOSITION FROM FRESH AND DRIED AERIAL PARTS OF *DOREMAAMMONIACUMD.DON*.

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This study compares the chemical compositions of the essential oils obtained from fresh and dried aerial parts of *DoremaammoniacumD. Don* [1]. GC and GC/MS analysis of the plant essential oils [2,3] led to the identification of 13 components in the oil of fresh plant material while 21 components were detected in the oil from dry plant powder making 92.25% and 88.81% of their oils respectively. The main constituents of the essential oil of fresh plant were nerolidol, 2E-tridecenol, farnesol, *trans*-farnesol, Hexadecanal, Tetradecanal and Tridecanal constituting 57.83% of the oil and those of dry plant were E-nerolidol, junenol, botrydiol, nonadecane, nerylacetone, *p*-Cymen-8-ol, 2E-Tridecen-1-al, farnesol, dihydroactinolide and tetradecanal making 43.91% of the oil.

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National Congress on Medicinal Plants
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Kish Island



MEASUREMENT OF WATER REQUIREMENT AND CROP COEFFICIENT OF *SATUREJA HORTENSIS* IN ARDABIL

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Each year high volume of consumed water in agriculture is wasted without any effect on increases the yield, due to lack of awareness and unsuitable management practices. These losses in water efficiency can be reduced by awareness from proper water requirement of crop plants. The aim of this study was to measurement of water consumption of *Satureja hortensis*. Using lysimeter method. For instance plants were grown in rectangular pots, outside of greenhouse, and input – output water levels were measured. Plants were harvested at flowering stage. Using cropware software and weather date obtained from meteorological station of Ardabil, reference evapotranspiration of plant was determined. Then crop coefficient (k_c) of savory was calculated by $ET_c = K_c \times ET_o$ equation.

Water requirement in Jun, July, and August were 5.67, 7.57, and 9.43 respectively and crop coefficients for these months were 1.071, 1.058, and 1.397 respectively. Result indicated that, the minimum and maximum water requirement were occurred in first and was in the third month of plant growth. Increases in water requirements can be related to increases in growth of leaf and aerial part of plant. The amount of essential oils obtained from these plants was 1.25% that didn't show significance difference with farm condition (1.5%). This research was done in unique growth period since the water requirement of plant is a function of environmental conditions, it would be better to do this experiment for several successive years and also, yearly conditional environment be considered [1,2].

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ASSESSMENT OF GENETIC DIVERSITY IN *HYOSCYAMUS SP.* USING AFLP

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To estimate the genetic diversity of *Hyoscyamus* germplasm, the seeds of forty five (45) accessions of *Hyoscyamus sp.* were collected from different wild habitat areas of Iran. The AFLP procedure was performed with appropriate modifications of the method described by Vos *et al.* (1995). The results showed that AFLP marker system is very suitable and reliable method for assessment the genetic diversity of *Hyoscyamus sp.* Analysis of banding patterns of 17 AFLP primer combinations revealed 251 polymorphic bands. A total of 251 polymorphic fragments were scored with an average of 15 fragments per primer combination. The results of cluster analysis demonstrated a high level of genetic diversity in *Hyoscyamus sp.* accessions. These results provide important information with regard to future domestication and breeding programs for management of germplasm resources.

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EFFECT OF IRRIGATION REGIMES ON SEEDS AND AERIAL PARTS YIELD ESSENCE CONTENTS CUMIN (*CUMINUM CYMINUM* L.) ACCESSIONS

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Cumin is one of the most important medicinal plants of Apiaceae family. This plant grows well in dry and semi-dry regions of the world. However, there is not enough information on the effect of irrigation regimes on seeds yield and aerial parts yield and essence contents of cumin. Therefore, this experiment was conducted to determine the effect of three irrigation regimes (70 mm (control treat), 150mm (medium stress) and 200mm (severe stress) pan evaporation Class A) on four accessions (Isfahan, Nishapur, Khour o biabanak and Yazd) of cumin. The experiment was carried out in randomized complete block design with a split layout and four replications in Isfahan during 2010-2011 growing seasons. The results showed that the seed yield was not affected by irrigation regimes and accessions. However, irrigating plants with 70 or 150mm produced higher aerial dry matters than 200mm. There was no difference between accessions for their dry matter production. Plants irrigated with 150 or 200 mm water produced higher seed essence contents than 70 mm whereas plants irrigated with 70 or 150 mm produced higher aerial essence content than 200 mm. Isfahan produced the highest seed essence content while Neyshaboury had highest herbal essence content. The results showed that 150 mm was the best irrigation regime and Isfahan was the superior accession.

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EFFECT OF CAMMERCIAL PLANT AND CHEMICAL MEDICINES ON SERUM LIPIDS OF BROILERS CHALLENGED WITH INFECTIOUS BRONCHITIS VACCINE VIRUS

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Some of the active substance of medicinal plants causes the decrease of abdominal fat and serum lipids. In the study, 450 strains of Arian broiler chicks were divided in to the 10 treatments with three replicates and 15 chicks per replicate. Treatment 1 to 9 in 14 days old was received vaccine IB – 4/91, 5 times greater than the standard dose. Treatment 10 was received the standard dose of vaccine. Treatments 1 to 8 were received the drugs via drinking water from 15 days old till final duration. Plant medicines treatments were: 1) Mentofin[®], 2) Anzofin[®], 3) Antibiofin[®], 4) Immunofin[®], 5) broncofin[®], 6) Zagrol[®] (essential oil of Savory), and chemical medicine were: 7) Bromhexin and 8) Enrofloxacin. The amount of abdominal fat and concentration of cholesterol, triglyceride, HDL, LDL in the end of the period (42 days of old) was determined. There was significant difference between treatments in concentration of cholesterol. Anzofin have lowest concentration of cholesterol and hadn't significant difference with control groups but had a significant difference with mentofin which had the highest concentration of cholesterol. There was no significant difference between treatments in concentration of triglyceride ($P > 0/05$). The lowest and highest concentration of triglyceride was observed in mentofin and bromhexin treatments respectively. Mentofin treatment had the lowest and Anzofin treatment had the highest concentration of LDL and between them observed significant difference ($P < 0/05$). Also the highest and lowest concentration of HDL was observed in Anzofin and negative control respectively ($P > 0/05$). Essential oils inhibit activation of HMG-COA reductase. Inhibition of 5 percent activation of HMG-COA reductase can be reducing 2 percent serum cholesterol of poultry [1, 2].

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THE EFFECTS OF COMMERCIAL HERBAL AND CHEMICAL MEDICINES ON ABDOMINAL FAT, IMMUNE SYSTEM AND PERCENT OF VIABILITY OF BROILERS CHALLENGED WITH INFECTIOUS BRONCHITIS VIRUS

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Some of the active substance of medicinal plants can improve immune system and decrease amount of abdominal fat in poultry. Decrease in amount of abdominal fat can be due to improve the immune system [1]. In this study, 450 strains of Arian broiler chicks were divided into the 10 treatments with three replicates and 15 chicks per replicate. Treatments 1 to 9 in 14 days old were received vaccine IB – 4/91, 5 times greater than the standard dose. Treatment 10 was received the standard dose of vaccine. Treatments 1 to 8 were received the drugs (Mentofin[®], Anzofin[®], Antibiofin[®], Immunofin[®], Broncofin[®], Zagrol[®] (essential oil of Savory), Bromhexin and Enrofloxacin) via drinking water from 15 days old till final duration. The lowest abdominal fat was observed in Anzofin and after that in immunofin treatment, which had significant difference with negative control, possesses highest abdominal fat ($P < 0/05$). Immunofin and positive control showed the highest and lowest response to injection of phytohemagglutinin, respectively ($P < 0/05$). The highest H/L ratio was observed in positive control that had significance difference with all treatment except of Anzofin. In both period of 27 and 41 days old the highest and lowest antibody titer against Newcastle virus belonged to Anzofin and positive control treatments respectively although it was not statistically significant ($P > 0/05$). The highest percent of viability was observed in Zagrol and Immunofin treatments and the lowest was related to positive control. There was no significant difference between treatments ($P < 0/05$). In the study we found that plant medicines Anzofin and Immunofin can be improved immune system in broilers. Immunofin is the extract of Purple coneflower. Purple coneflower belongs to photogenic compound that can improve the immune system [2].

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GOOD BACTERIA, ORGANIC MEDICINAL PLANT: THE EFFECTIVE OF *STREPTOMYCES* AND THREE DIFFERENT TREATMENT OF VERMICOMPOST ON YIELD AND ESSENTIAL OIL OF PEPPERMINT (*MENTHA PIPERITA*)

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In the recent years, the interest in medicinal herbs has increased in a great deal. Application of chemical fertilizers may alter the desired chemical composition of medicinal plants or lead to accumulation of their residue in the plant. The search for alternatives to chemical fertilizers has been considered due to the emergence of environmental pollution and health concerns for the producer and the consumer. The use of plant growth promoting rhizobacteria (PGPR) may provide an effective approach to reduce these problems. *Streptomyces* are gram positive bacteria that have a great capacity to survive in adverse environments such as saline soils. Plant growth promotion potential of these microorganisms was reported frequently [1]. Peppermint (*Mentha piperita*) is a medicinal plant that is extensively used in food and drug industries. In this study, the ability of an auxin and siderophore producing *Streptomyces* isolate (strain C) to promote growth of Peppermint was evaluated under field conditions [2]. Different amounts of Vermicompost (1, 2 and 4 t/ha), *Streptomyces* and mixture of Vermicompost and *Streptomyces* were applied. The results showed that the use of 2 t/ha Vermicompost+ *Streptomyces* and 4 t/ha Vermicompost+ *Streptomyces* significantly ($p \leq 0.01$) increases essential oil yield and efficiency and dry weight of Peppermint respectively. This study indicates that *streptomyces* isolate C has potential to be utilized as biofertilizer for medicinal herbs.

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THE INTRACTION BETWEEN EFFECT OF STREPTOMYCES AND DIFFERENT LEVELS OF VERMICOMPOST EXTRACT ON SEED VIGOR OF *THYMUS DAENENSIS* AND *SATUREJA HORTENSIS*

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Satureja hortensis and *Thymus daenensis* are medicinal plants that extensively used in food and drug industries. A positive correlation exists between seed germination and productivity. Seed germination is a very important phase in growth of plants [1], especially medicinal herbs. In order to evaluate the effect of Streptomyces on seed germination of *S. hortensis* and *Th. daenensis* an in vitro assay was carried out. The experiment was arranged on the basis of completely randomized block design (RCBD) with four replications. Treatments consisted of 100, 20 and 12/5% water extract of vermicompost (saturated solution) with and without Streptomyces culture filtrate. The results of this study showed that all fertilizer treatments increased seed germination and vigor index significantly ($P \leq 0.01$) compared to control. The application of 20% vermicompost extract + Streptomyces culture filtrate increased seed vigor 25%. The use of more amount of vermicompost extract (100% saturated solution) was not as effective as Streptomyces. It can be concluded that application of streptomyces stimulate growth and seed germination of medicinal plants and it can be suggested as a biofertilizer[2].

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ANATOMICAL STUDY OF LEAF AND STEM OF *THALICTRUM*. IN IRAN

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Ranunculaceae, is a large family, distributed worldwide, it consists of almost 1,800 species in about 62 genera. *Thalictrum* is a medium sized genus consisting of 120-200 species of herbaceous perennial flowering plants that has 5 species and 1 variety (*Th. Minus*, *Th. Minus var. majus*, *Th. Foetidum*, *Th. sultanabadensis*, *Th. Isopyroides*, *Th. Simplex*) in Iran that mostly grows in moderate and cold regions. Members of *Thalictrum* are used for a broad variety of purposes, mainly as medicinal and ornamentals importance. As in *Th. Minus* there are some alkaloids such as Thalirabine and Thalifine that their antibacterial effects had been proven. Anatomy is a proper method for investigating this genus. In this study the leaf and stem of *Thalictrum* species were fixed, freehand sectioned and stained according to usual micro techniques compared with each other. Leaf anatomy of all studied species showed dorsiventral parenchyma except for *Th. Isopyroides* that shows isolateral parenchyma. Trichomes in *Th. Minus* and *Th. Majus* were bicellular but in *Th. Foetidum* unicellular and multi cellular hair were observed. Superficial stomata exist in abaxial surface of all species. The stems in transverse section were angular in all examined species except for *Th. Sultanabadensis*. Internal phloem was observed in *Th. Isopyroides*. The differences among these species were great enough to identify of each species separately.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EVALUATION OF MOST EFFECTIVE VARIABLES INFLUENCING CORIANDER (*CORIANDRUM SATIVUM*) DRY MATTER YIELD AT SALT STRESS CONDITION

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Salinity has drawn extensive attention throughout the world because over 6% of the earth's land area (up to 800 million hectares) is affected by either salinity or the associated condition of sodicity [1]. Different statistical techniques have been used in modeling plants yield, including correlation, regression, path analysis, factor analysis, factor components and cluster analysis. Correlation coefficient is an important statistical procedure to evaluate breeding programs for high yield, as well as to examine direct and indirect contribution of the yield variables [2]. 30 coriander seeds were sown in plastic pots containing 3.5 kg soils. Six weeks after sowing, the seedlings were treated by salt water (80 mM). Coriander plants were harvested 10 days after salt stress treatment. Afterwards, characters such as plant height, leaf fresh weight, stem fresh weight, total fresh weight, leaf dry weight, stem dry weight and total dry weight were determined. Six statistical procedures including; simple correlation, path analysis, multiple linear regression, stepwise regression, factor analysis and cluster analysis were used to study the relationship between coriander dry matter yield and its components under salt stress conditions. Appropriate statistical analysis was done using SPSS package [3]. Results revealed that leaf and stem dry weight were the most effective variables influencing coriander dry matter yield based six statistical procedures. Based on the results, it is reasonable to assume that high dry weight yield of coriander plants under salt conditions could be obtained by selecting breeding materials with high leaf and stem dry weight.

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CYTOGENETIC AND POLLINATION STUDIES IN SEEDLESS BARBERRY (*BERBERIDACEAE*) AND ITS RELATIVE SPECIES IN EASTERN IRAN

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Seedless barberry (*Berberis vulgaris* L. var. *asperma*) is one of the medicinal plants only cultivated in eastern parts of Iran. Its origin, ancestral progenitors and mechanisms of seedless fruits production is not clear. In present study, for the first time we investigated similarity between *Berberis integerrima* (native to eastern Iran and having seedy fruit) and seedless barberry on the basis of ploidy level by karyotype preparation and Flow cytometric analysis. *B. integerrima* and seedless barberry were tetraploid ($2n = 4x = 56$). Then, in order to study the factors preventing seed formation, pollination studies including self-pollination, reciprocal cross-pollination and open-pollination was carried out and the effects of individual treatments on seedy and seedless fruits, fruit set rate and fertility of flower were investigated in populations of seedless barberry and *B. integerrima*. Analysis of Variance indicated that Pollination treatments had a significant effect ($p < 0.01$) on seeded fruit percentage. The type of species had a significant effect ($p < 0.01$) on fruit set, seeded fruit and seedless fruit percentage. Results showed that self incompatibility have main role in seedlessness of seedless barberry. Previous studies and results of present study support our hypothesis asserting *B. integerrima* is probably one of the major ancestors of seedless barberry.



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



QUANTITATIVE ANALYSIS OF TRIGONELLINE IN DIFFERENT STAGES OF DEVELOPMENT IN *TRIGONELLA FOENUM-GRAECUM*

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Fenugreek (*Trigonella foenum-graecum* L.) is an annual herb belonging to the legume family, this plant is located in Mediterranean countries and western Asia. It is found in different parts of Iran such as Lahijan, Isfahan, it has a long history of medical uses. Trigonelline (N-methyl nicotinate) is the most important alkaloids in Fenugreek and is the secondary metabolite formed from nicotinate that has several physiological properties such as anti-cancer, regenerate dendrites and axons, in addition to memory improvement (Alzheimer's disease) and anti-diabetic (lower fasting serum glucose levels). Trigonelline was extracted using the main protocol and then extracts were filtered and amount of Trigonelline was analysed in different stages of development by HPLC method. According to our results, there is high Trigonelline level in seed and then in flower.

METHODS OF PLANTING AND DOMESTICATION OF MEDICINAL PLANT OF *HERACLEUM PERSICUM*

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One of the medicinal plants growing in northern areas of Iran and Golestan Province is *Heracleum persicum* belonged to Umbelliferae which has different medicinal characteristics. This plant grows naturally in garden margins and under trees shadow in areas from 2000 m to 3000 m elevation. Merit soil for planting of this species is light texture. *Heracleum persicum* has 6 species and perennial with hollow stem and thick, straight, cylindrical and hairy that its height is between 75 to 150 cm. planting date depends on method of propagation. In case of seed cooling, the good time is April. Otherwise the best time for seed planting is fall season. This medicinal plant is helpful for stomach and digestion system. This plant is powerful antiseptic and germicide and consumption of it by women cause to increase milk. View point of urinal system cause to creation of urine and its powder is used as vermicide in digestion systems.



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Kish Island



PREVALENCE AND CAUSES OF THE CONSUMPTION OF HERBAL DRUGS IN PREGNANT WOMEN ADMITTED TO HOSPITAL IN MOBINI SABZEVAR IN 2011 YEARS

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Herbal medicine is an ancient science .pregnant women had been using those very high. While our knowledge is very little about this herbal science. Thus the study with aim of herbal drugs and the frequency of its use in pregnant women was conducted. This study was a cross – sectional and was conducted during the first 4 months 2011 years .The sample included 236 women admitted to labor in different parts of the Sabzevar- Hospital .Data was collected by using of Check list form That first part was about demographic characteristics and second part use of various herbal medicine and the reasons for its use, including 19 question as the interview was conducted. The collected Data by the SPSS16 software and Fisher, s exact tests were analyzed. A significant level of 0/5 was considered. The average ages of people who were using herbal medicines were 27.5 ± 5.50 and averaged weeks gestational age among consumers was 38.45 ± 3.01 and among those who did not use was 39.2 ± 1.92 . The most commonly used plants in the ranks were Sof of (including cumin seed, manna, seed of dill)(27.4%,(70case), cumin (21.6%, (51case), sweat Mint (18.1,43%), forty plants (15.5,37%) , borage (10%, 24) and sweat chicory (9.6%, 23) has been the Most of the cause of consumption was related to heartburn (27.5%, 65), abdominal pain (24.4%, 58) and to cold nature and prevent neonatal jaundice (18.5%, 37) .The most period of the use of herbal medicines was in the third trimester (112 case) 47.4%. About (109) 46.2% pregnant women used more than 10 times of herbal medicines during pregnancy.The results showed that a high percentage of pregnant women during pregnancy used the herbal medicines. Levels satisfaction with the use of herbal medicines was high. Due to the high consumption of herbal medicines in the pregnant women, the study suggested that more research be done in different areas with a larger sample size too.

ANTIFUNGAL ACTIVITY OF *PISTACIA ATLANTICA* SUBSP. *KURDICA* ESSENTIAL OIL AGAINST *BOTRYTIS CINEREA* Pers. Fr.

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Pistacia atlantica subsp *kurdica* belonging to *Anacardiaceae* is a very important medicinal plant that mainly centered in Iran and Afghanistan. This subspecies's oleoresins traditionally use for eczema treatment, throat infections, renal stones, asthma and stomach ache and as an astringent, anti-inflammatory, antipyretic, antibacterial, antiviral, pectoral and stimulant. Essential oils are aromatic oily liquids obtained from different plant materials. The advantage of essential oils is that they are bio-degradable in nature, non-pollutants, posses no residual and they are active in vapour phase. For investigate *in vitro* antifungal effects of the leaf and inflorescence essential oils extracted from male and female trees of *P. atlantica* subsp. *kurdica* against *Botrytis cinerea* an experiment carried out by the poison food medium method in four concentrations (0, 1000, 2000 and 3000 μ l/l) and three replications. The results showed that leaf essential oils of both genders inhibited the growth of *Botrytis cinerea* in 3000 μ l/l concentration, but their inhibitory effects were only fungistatic. The inflorescence essential oils of male and female trees had lower antifungal effects than leaf essential oils so that the growth of *Botrytis cinerea* observed in 3000 μ l/l concentration. The present study refer that leaf essential oils of male and female trees of *P. atlantica* subsp. *kurdica* can be used as a natural toxicant against the fungal attack on stored food commodities such as food grains, pulses, vegetables and fruits to enhance their shelf life.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island





National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



EVALUATION OF ANTIBACTERIAL EFFECT OF ETHANOLIC EXTRACTS OF THE LEAVES, FRUIT PULP AND THIN STEM OF *OLEA EUROPAEA* AGAINST SIX BACTERIAL STRAIN.

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Medicinal plants are the oldest known source for treatment of disease. In this research, the antibacterial activity of the ethanolic extracts of the leaves, fruit pulp and thin stem of *Olea europaea* were evaluated against *Staphylococcus epidermidis* (ATCC 12228), *Staphylococcus aureus* (ATCC6538), *pseudomonas aeruginosa* (ATCC9027), *Escherichia coli* (ATCC 8439), *Salmonella typhimurium* (ATCC 14028), *Klebsiella pneumoniae* (ATCC 10031). The minimum inhibitory concentration (MIC) values for each part of plant were determined by agar dilution method. The maximum antimicrobial activity of ethanolic extracts was exhibited by thin stem and for all extracts was less than 5 mg/ml which shows good track of antimicrobial effect which may lead to the use of extracts as a preservative in food or template of new generation of antibacterial material after further more evaluation about the composition of extracts.

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National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



Index

- Aarabi Arebani, Leila, 233
Abadian, Hoda, 336
Abarsaji, Ghasem Ali, 55
Abaszadeh, Bohlol, 115, 49
Abbas Dokht, Hamid, 201, 217
Abbasi Maleki, Navid, 215
Abbasi Maleki, Farid 211
Abbasi Maleki, Saeid 211, 215
Abbasi, Fatemeh 347
Abbasi, Saeed 244, 9, 10
Abbasi, Soleiman, 251, 92 147
Abbasian, Arastoo 235
Abbaspour, Nasser 239
Abbaszadeh, Bohlol 52, 95, 160, 161, 162, 166, 168, 176, 196, 197, 352, 400
Abdali Mashhadi, Alireza 201, 203, 236, 238, 313
Abdi, A. 216
Abdi, Gholamreza 69, 133, 134
Abdolahi, Kolsoum 105
Abdollahi, F. 129
Abdollahzadeh, A. 470
Abdolmaleki, Parviz 8
Abdolmohammadi, Ronak 68
Abdolzadeh, Ahmad 157, 158, 159
Abdy, E. 383
Abedi, Zeinab 247, 248
Abedini, Masumeh 99, 124, 132, 368
Abolghsem Mortazavi, S. 380
Abotalebi, Abdolhossein 37, 101
Abotalebie, A. 143
Abouali, M. 44
Abravesh, Z. 66
Abrishamchi, Parvaneh 16, 411
Abroun, S. 14
Aburas, Lina 469
Achak, Mohammad-Usef 349, 473
Adeli, Abrisham 179
Adibhesami, Masood , 45, 79
Afghani Khoraskani, Ladan 280
Aftuni, davood 42
Afkar, Soheila 310
Afraah, Hadi 374
Afrazah, Yasaman 272, 372, 381
Afsharmanesh, Mohsen 177, 385
Afsharzadeh, Nashmil 347
Afshinpour, Salman 403
Afzalifar, Mostafa 11, 253, 255, 330
Agah, F. 206
AghaAlikhani, Majid 131, 146
Aghaei, Keyvan 344
Aghaiefard, Fatemeh 258
Aghamohamd rafie, Nasrin 408
Agharahimi, Jaber 174, 353, 416
Aghasizade, Malihe 153
Aghdasi, M 388, 389
Aghdasi, Mahnaz 364
Aghighi ravan, Fateme 404, 410
Ahani Azari, M. 140, 141
Ahani Azari, Mojtaba 432
Ahmad vand, Hasan 262
Ahmadavnd, H. 358
Ahmadi Koulaei, Sheyda 433
Ahmadi, Amirhossein 58, 402
Ahmadi, E. 296
Ahmadi, Elmira 97
Ahmadi, Jafar 458
Ahmadi, Kamal 98
Ahmadi, N. 152
Ahmadi, Sh. 225, 358
Ahmadian Chashmi, Najmeh 263
Ahmadian, M. 2
Ahmadian, Ahmad 242
Ahmadian-Attari, Mohammad Mahdi 30, 123, 187, 322, 454
Ahmadichenarbon, Hossein 463, 464
Ahmadi-Khoei, Mossumeh 251
Ahmadpoor Dehkordi, S. 29
Ahmadpoor Dehkordi, Susan 133
Ahmadtash, Ahmad 313
Ahmady, M. 312
Ahmadzade Ghavidel, Reyhane 121, 282, 307, 401
Ahmadzadeh, Reihaneh 405
Ahvazi, M 31
Ahvazi, Maryam 13
Aida Ahmadi, Seyyedeh 96
Ajizadeh, Mohammad Reza 426, 428
Akbari nia, Ahmad 28, 75, 78
Akbari, Zahra 326
Akbari, Gholam Ali 284, 334
Akbari, H. 304, 305, 306
Akbari, Hossein 167
Akbari, Parisa 221
Akbarinia, Ahmad 87
Akbarpoor, Abolfazl 364
Akbarpour, Hasan 230
Akbarpour, Vahid 235, 324, 3235, 365, 398, 443
Akbarzadeh, M. 31, 100, 100
Akbarzadeh, Mehrdad 241, 51
Akhbardeh, Mahdi 19
Akhbari, Maryam 8, 41, 189, 205, 217, 233, 234, 339
Akhlaghi, S.h 378
Akhondi, Mahdi 171
Akhoundzade Basti, Afshin 419
Akramian fard, Mojtaba 382
Akramian, Morteza 370
Al Mansouri, Hajar 92
Alaghemand, Atena 303, 405
Alam, Fatemeh 429
Alazmani, Mohamad 229



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Alem bagheri, Akram 46
Alemansoor, Hasan 296
Alemardan, Ali 152
Alemzadeh, Abbas 180
Aliabadi, A 378
Aliahmadi, Atusa 346
Aliakbari, Farhang 135
Aliasgharzad, Naser 48
Alibaygi, Amirhossein 347
Alichi, Mahmood 294, 295
Alijanpour, Rahim 294
Alimardani Naghani, Farshid 34, 35, 267, 352
Alimoradi, Leila 154
Alimoussazadeh, Saeid 403
Alipour Eskandani, Majid 434
Alipour Fard, M. 143
Alipour, Faezeh 371
Alipour, M.R. 312
Alipour, MohammadJavad 394
Ali-Reza Koocheki 44
Alishahi, M. 359, 383, 305
Alizadegan, Zainab 380
Alizadeh Anaraki, Kambiz 196
Alizadeh, Ardalan 185, 37, 305
Alizadeh, Mohammad 171
Alizadeh, Moreza 402
Alizadeh-makvandi, Acieh 119
Alizadeh-Salteh, Saeideh 200
Allah Bagherifard, Amin 181
Allah Resani, Ali 379
Allahdadi, Iraj 284, 308
Allahtavakoli, Mohammad 365, 442
Allahverdi mamaghani, Bahareh 46, 223
AlldinNasiri-Bezenjani, Moien 259, 260
Ally, Nasim 142
Alsadat Moosavi Nasab, Maryam 451, 418
Amani, Mahdie 387
Ameri, Ali akbar 231, 232
Amerian, Mohammad Reza 201
Amin Samih, Mohammad 53
Amin, Gholamreza 68, 73, 114, 306, 388
Aminghafori, Afsaneh 137, 136, 196
Amini Chermahini, Fatemeh 244, 246
Amini Dehaghi, Majid 104, 109, 126, 135, 145, 390
Amini Rad, Mohammad 406
Amini, Kumars 173, 207
Amini, Maria 353
Amini, Sheno 283
Aminifard, M. H. 50, 51
Aminifard,1, Mohammad Hossein 107
Amininejad, Gholamreza 81
Amir Nejad, Hamid 380
Amiri, H. 358
Amiri, Hamze 231, 262, 357
Amiri, Janet 415
Amiri, Mohamad Behzad 270, 271, 273
Amiri, Mohammad Sadegh 227, 324
Amirinejad, Mahdiyeh 308
Amirinia, M. 291
Amiri-zadeh, Naser 298, 469
Amirmoradi, Shahram 114, 219, 220
Amirnejad, Hamid 6, 443
Amirzadeh, Nima 305
Amoheidari, Mehdi 286
Amooaghaie, R.189, 260, 297
Amooaghaie, Rayhaneh 188, 415
Anassori, Ehsan 80
Ansari Majd, Saeid 185, 197, 198
Ansari, Ali 255
Ansari, Khalil 269, 281
Ansari, Mehdi 279
Ansari, Mohammad 197, 198, 427
Ansori, A. 73
Arab, Mostafa 283
Arababadi, Mohammad Kazem 426, 428
Arabi, M. 297
Arabpour, Somayyeh 72
Arab-Rahmatipour, Gholamreza 386
Arbabian, S 445
Ardakani, Mohammad Reza 161, 168
Arekhi, S 389
Arezoomandan, Mohsen 346
Arezoomandan, Reza 315
Ariyai Monfared, Mohammad Hadi 220
Arj, A. 305
Arjomand, Delaram 97
Aroiee, H. 50, 51
Aroiee, Hossein 107
Arshi, Ruhollah 157
Aruee, Hossein 327
Arzani, Kazem 200
Asaadi, Kobra 207
Asad Abadi, Mohadese 366
Asadi Dashbulagh, Zhaleh 173
Asadi samani, Majid 171
Asadi, Ghorban Ali 194
Asadi, Sahar 265
Asadi, Susan 306, 388
Asadi-Corom, Fereshteh 349, 360
Asali, Zahra 387
Asami, Zeynab 382
Asareh, Mohamad Hassan 32
Asemi, Mehdi 436
Asgari Abbaszadeh 355
Asgarian, Tahereh Sadat 40, 41
Asgarpanah, Jinous 215, 125
Asghar Zeinali, Mir Ali 384, 417
Asghari Zakaria, Rasool 225
Asghari, Behzad 386
Asghari, Majid 213
Asghari, Parinaz 55
Asgharipoor, Mohammad Reza 181
Asgharzadeh, Ahmad 146
Asghri, Jhila 282



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Ashori, Morteza 191
Ashrafi Parchin, Mehdi 226
Ashrafi Parchin, Reza 26
Ashrafi, M. 14
Asili, J. 353
Asili, Javad 411
Askari, Elaheh 351
Askari, Fatemeh 240, 290
Askari, Hossein, 363
Askari, Mahdiye 316
Aslani Zo, Elahe 399
Aslanipour, Behnaz 342
Asrar, Zahra 182, 193, 248, 249, 250
Asri, Younes 112
Assareh, M.H. 66
Assareh, Mohammad Hasan 161
Ataei Azimi, Azra 430, 431
Ataei, Leila 89, 211
Atri, M. 2, 24
Atri, Morteza 23
Attar, Farideh 390
Ayoobi, Fatemeh 365
Ayyari, Mahdi 460, 323
Azad, Abolfazl 65
Azadbakht, Mohammad 402
Azadi, Pejman 6
Azadi, R 473
Azadi, Rahman 218
Azadi, Siamak 439
Azanchi, Taravat 125
Azarmehr, Bentolhoda 266
Azarnia, Mahnaz 108
Azarnivand, Hossein 170
Azemi, M. E. 398
Azhdari, Ghanimat 325
Azimi, Nafise 171
Azizi, Ali 13, 331, 404
Azizi, Golsoomeh 44
Azizi, M. 50, 51
Azizi, Majid 60,258, 308, 317
Azizi, Mohammad Hossein 147
Azizi, Rezvan 292, 293, 341
Babadaei Samani, Ramin 304
Babaie, Mohadese 193
BabashpourAsl, Marzieh 294
Babri, Khalil 51
Badr, Parmis 278
Bagban, H. 312
Baghaie, Nasim 390
Bagheri Kia, Hannaneh 117
Bagheri, Abdolreza 209, 327, 447, 450, 76
Bagheri, Amin 394
Bagheri, Mahboube 419
Bagheri, S. 358
Bagheri, Samaneh 227
Bagheri, Shahrokh 262
Bagherifard 181
Bagherzade Kasiri, Khazar 317
Bagherzade, Ghodsie 183
Baghizade, Amin 205, 259, 260, 308, 420, 421
Bahador, Mahmoud 238, 313
Bahadori, Farzane 107, 252, 257
Bahadori, Mir Babak , 432, 433
Bahamin, Sadegh 409
Bahktiyari Ramezani, Mohamad 46
Bahmanabadi, Javad 282
Bahmani, Kaivan 284, 331, 332,333,334,
Bahmanyar, Mohammad Ali 235, 336
Bahmanzadagan, Atefeh 82
BAhmanzadagan, Atefeh 101, 82
Bahmanziyari, Farhah 442
Bahraini, Lida 366
Bahram Dalir-Naghadeh, 80
Bahrami, Ahmad Reza 16
Bahrami, H 459
Bahraminejad, Sohbat 215, 228, 244, 249, 10, 26
Bahramnejad, Rowshanak 202, 203
Bahreyni Por, Lida 392
Bakhshandeh, Abdolmahdi 203
Bakhshi Khaniki, Gholamreza 75, 290, 293
Bakhshi, Davood 429
Bakhteyari, M. 80
Bakhtiar, Ziba 15
Bakhtiari, Ameneh 111, 281
Bakhtiarian, Azam 45
Balaghatnia, Faezeh 77
Balali Dehkordi, F. 90
Balandari, Ahmad 314
Balochi, Zahra 319
Balouchi, H.R. 29, 90
Balouchi, Hamidreza 69, 113, 132, 133
Baluchnejadmojarad, Tourandokht 190, 191
Baradaran, Reza 237
Barahimi, Somaye 408
Barazesh, Mahdi 462, 466
Barkhordari, Kobra 315
Barzegar, Mohsen 38, 60, 61, 144, 149, 150
Barzegar, Mona 312
Barzegar, Zohreh 409
Baseri, Rahmat Allah 196
Bashirisadr, Zeinolabedin 186
Basiri, Zainab 345
Basirjafari, Sedighe 330
Bassami, Bahar 142
Bathaie, S.Z. 14
Batooli, Hossein 41, 189, 233, 242, 246, 335, 399, 474,
475, 476,
Bazrafshan, Mojtaba 57
Bazvand, Maryam 391
Bazyar, Ahmad 432, 353
Bazzi, Fateme 399
Behbahani, Mandana 92, 243, 345
Behbahani, Mona Sadat 147
Behbahani, Persia 83



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Behdani, M.A. 203
Behdani, Mohammad Ali 364
Beheshti, Akram 128
Behmanesh, M 470
Behmanesh, Mehrdad 4, 102, 130, 397, 472
Behnam, Azita 338
Behpoor, Ali 86, 122
Behrooznam jahromi, Behnam 305
Behzad, Sahar 468
Behzadi, Maryam 119
beighi, Reza Mohamad 121
Beiki, Fahimeh 250
Bejeli, Mehresa 101
Bekhradi, R.304, 305, 306
Berizi, E.356, 357
Bernard, Françoise 140
Beshamgan, Elham sadat 345
Beyraghdar Kashkooli, Arman 413
Beyranvand, Somayeh 456
Bhdad, Mohammad 191
Bibak, Hossein 452
Bidaki, Samira 94
Bidarigh, Sirous 33
Bigdeli, Mohsen 327, 423
Bigdeli-Azari, Zahra 77
Bigonah, Hassan 36
Bijanazadeh, Ehsan 122, 86
Bijeh Keshavarzi, Mohammad Hosein 428
Bojarpour, Mohammad 436
Bolandhematan, Fatemeh 88
Bonfill, Mercedes 469
Borghei, Sara 72
Borhani, G. 210, 241
Bostani, Abdul Amir 33
Bozorgi, Mahboubeh 279, 314
Burburi, Fariba 337
Chabra, Aroona 58
Chaiechi, Mohammad reza 111
Chaji, Morteza 436, 437, 438, 439
Chalabian, Firoozeh 52
Chalavi, Vida 94, 103
Chamangasht, Saeed 162, 176
Chapolagh Paridari, Iman 116
Cheghamirza, Kianoosh 215
Chegini, Gholam Reza 332
Cheraghi, Narjes 309, 419
Cheshmekaboodi, Fardin 446
Choromzadeh, Mehrnaz 189, 246
Dabbagh Mohammadinasab, Adel 119
Dadashpour, Mehdi 2
Dadgar, Mohsen 141
Dadi, Monad 206
Dadkhah, Abolfazl 77
Dadkhah, Atefe252
Dadman, Behnaz 109, 121
Daneshfar, Elham 242
Daneshvar, Hadiseh 258
Darbandi, Elham 448
Dardan, Esmaeil 221
Darvishzadeh, R. 393
Darvishzadeh, Reza 440, 441
Darzi, Mohammad Taghi 39
Dastan, Dara 364, 466
Dastar, B. 140, 141
Dastour, Atefeh 407
Davari, Marzie 187
Davarian, Tania 324, 325
Davati, Ali 20
Davazdahemami, Saeed 42
Davoodi, Daruosh 164, 165
Davoodi, Mehdi 405
Davoodi, Poorandokht 131
Davoodi, Saeid 85
Davoudi, seyed Massoud 462
Dehbashi, Khodabakhsh 346
Dehbashi, Moin 26
Dehestani, Maryam 406
Dehghan Nayeri, Fateme 385
Dehghan, Esmail 440
Dehghan, Hossein 432
Dehghan, Mahlagha 375
Dehghani, Fariba 164
Dehghani, Mahsa 98
Dehghanzadeh, Hamid 204
Dehkhoda, Negah 204
Dehnavi, A. 383
Dehpour Jouibari, A. A. 160, 250
Dehpour, A A. 151
Dehpour, Abbas Ali 66
Dehqani Tafti, Ahmad Reza 284
Dehshiri, Mohamed-Mehdi 320, 321
Delavar, Hassan 354
Delavar, Kouros 453
Delazar, Abbas 63, 118
Delnavaz Hashemloian, Babak 430
Delnavaz Hashemloian, Yasaman 430
Delshad, Mahsa 371
Denavaz Hashemloian, Babak 431
Derakhshan, Vahid 195
Deriss, Lila 155
Deysi, Zeinab 81
Dezhimand, Amin 50
Dezhpasand, Mohammad Reza 252
Dianat, Mahin 342
Dilmaghani, Kamalaldin 350
Djavadi, Seyede Bahereh 361
Dodman, Arash 74
Dolati Bane, Hamed 350
Dolatkahi, Ali 81
Dolatkahi, Mehdi 81, 224
Dolatkhani, Parisima 192
Doraji, Mohammadali 376
Doraki, Nader 144
Doryanizadeh, Mahtash 82



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Dousti, Abufazel 313
Dowlati, Parvin 151
Ebadi, Ali 139
Ebadollahi –Natanzi, Alireza 190, 386
Ebrahimabadi, Abdolrasoul H. 242, 246, 395, 474, 475, 476
Ebrahimi Sadatloo, M.A. 312
Ebrahimi Varkiyani, Ali 458
Ebrahimi, Mohsen 244, 246
Ebrahimi, Mohammad Hasan 458
Ebrahimi, Puoneh 282
Ebrahimipour, Gholamhossein 466
Ebrahimipour norabadi, Maryam 409
Ebrahimzade, Samira 45, 79
Ebrahimzadeh, H. 256
Ebrahimzadeh, Hassan 4, 300
Effati, M. 140, 141
Eftekhari, Mostafa 332
Eghbali, Hamed 436, 438
Eghdami, Anush 303, 405
Ehyae, Hamid Reza 270, 271, 273
Eidi, Maryam 392
Eidi, Samaneh 369
Eimani, Hussein 108
Einafshar, Soodabeh 465
Ejtahed, Roghayehsadat 139
Ejtehadi, Hamid 16, 411
Ekbatan Hamedani, Saeedeh 262
Elahi, Mohammad 301
Elmieh, Alireza 53
Emadi, Mozhdah 227, 324
Emam, Mitra 349, 360
Emami, Ahmad 14, 42
Emarat pardaz, Javid 119, 99
En. Bakhtiary, Zohreh 442
Enayati Shariatpanahi, Mehran 11, 253
Engashteh V, Aliasghar 233, 234
Engashteh, Aliasghar 41, 339
Enteshari, Shekofeh 94, 138, 213, 275, 408, 415, 453
Eradatmand Asli, Davood 56, 303, 405
Erfanifard, Yousef 109
Ershad Langroudi, Motahareh 33
Esfahanizadeh Hosseinpoor, Mahtab 291
Esfandiari, Mina 448
Esfandiari, Samaneh 201
Esfandyari, Sadeh 252
Eshaghdatvatgar, L 392
Eshaghkhani, Yeganeh 239
Eshghi, Saeid 341
Eshraghi, S. 84
Eskandari Torbaghan, Mehrmoosh 232
Eslambolchi Moghadam, Sara 421
Eslamifar, Masoumeh 288
Esmaeili Rad A. 383
Esmaeili, M. A. 44
Esmaeili, Somayeh 46, 368
Esmaeilzadeh Bahabadi, Sedigheh 102, 104, 191
Esmaeli, Mahdieh 172
Esmaeili, Mohsen 386
Esmailbegi, Shokouh 148
Esmaili falak, Alireza 467
Esmaili, Ahmad 11
Esmaili, Hoseyn 382
Esna-Ashari, Mahmood 131, 410
Estaji, Alireza 414, 440, 441
Estajji, Ahmad 182, 183
Etedali, Parisa 92
Etelaie, Farzaneh 279
Etemady, H. 398
Etminan, Alireza 78, 91, 326, 438
Faale, Hadieseh 159
Fadaee, Alireza 454
Faghani, Elham 76
Fakhari Zavareh, Alireza 130
Falah poor, Fateme 309
Fallah delavar, Sadeh 441
Fallah Shamsi, S. R. 113
Fallah, Mohammad-Sadeh 197, 198
Fallahi Gharagoz, Sieamak 127
Fallahi, Siyamak 467
Fallahi, Zahra 194
Fallahpour, Farnoush 196
Fani Yazdi, Amin 124
Fani Yazdi, Fatemeh 124
Farahbakhsh, Hassan 156
Farahmand, Armita 47
Farahmand-Azar, Safa 80
Farahmandzade, Mahdi 264
Farahnejhad, Zohre 355
Farajee, Hooshang 5
Farajian, Farzaneh 57
Farajollahi, S. 358
Faramarzi, Fatemeh 444
Faramarzi, Mohammad Ali 175
Faravani, Mahdi 422
Farhad Molashahi, Narges 57
Farhadi, Mohammad 237
Farhadi, Reza 181, 186
Farhadi, Sareh 336
Farhadian, Tahereh 346
Farhangi, Mehرداد 7, 168
Farhoodian, Roja 217
Farhoosh, Reza 465
Farhoudi, Rozbeh 223
Farjadian, Abdolmajid 151
Farmani, Fateme 185
Farnad, Neda 342
Farokhi, Farah 117
Faryabi, Elham 229
Farzaneh, Mohsen 469
Farzani, Maryam 48, 363, 106
Farzin, Narjes 289, 290
Fatahi Moghadam, Mohammad Reza 139
Fatemi, T. 203



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Fathi, Behrooz 371
Fathi, Sepideh 87, 88
Fathiazad, Fateme 261
Fattahi, Somaye 348
Fayyaz, M. 24
Fayyaz, Payam 169, 170
Feili, Hamid Reza 17, 453, 454
Feili, Zahra 17
Feizbakhsh, Alireza 85
Feizi, Hassan 114
Filehkesh, I 378
Firuzi, O. 95
Fooladi, MM. 343
Fooladkar, Marjan 218
Forough, Maryam 317
Fotokian, Mohamad Hossin 164, 165, 173
Froozani, Elahe 25
Gaffarifar, Fatemeh 55
Galavi, Mohammad 186
Garosi, Soraya 348
Garusy, Lachin 173, 207
Gasemi, Marefat 57
Gashmard, Roqayeh 412
Gazerani, Samaneh 419
Geraei, Mohsen 17
Gerivani, Zahra 354, 355, 444
Ghabayii, Taleb 241
Ghaderi Hnramvz, Yadollah 448
Ghaderi Zadeh, Sareh 392
Ghaderi, Fatemeh 434
Ghaderi, Leila 389
Ghaderi, Ardeshtir 175
Ghadiri, Samaneh 404
Ghaedi, Ahmad 158
ghaedi, Abdolmohammad 154
Ghaemi zadeh, Fahime 404
Ghaemi, Ezzat Allah 198
Ghafari, Roozbeh 142
Ghafarzadegan, Reza 384
Ghaffari Khaligh, Sahar 309
Ghafghazi, Taghi 18
Ghafouri, Mozghan Sadat 61
Ghahremani Rad, Ghahreman 162
Ghahremani-majd, Hojat 370
Ghahremaninezhad, Mina 140
Ghaidamini Harouni, Maryam 350
Ghalavand, Amir 146, 154, 221
Ghamarinia, Mitra 219
Ghambarian, Mahnaz 359, 418
Ghanati, F. 270
Ghanati, Faezeh 8, 263, 142, 109, 130, 140, 299, 364, 4, 104
Ghanavati, R. 398
Ghanbari, Mahdi 367
Ghanbarian, Gholam Abbas 64
Ghandeharialavijeh, Zohreh 102
Ghanvati, Farangis 202
Gharabadiyan, Fatemeh 137
Gharineh, Mohammad Hosain 238, 313
Ghasemi Nezhad, Pezhman 377
Ghasemi Pirbalouti, Abdollah 34, 35, 265, 267
Ghasemi, Bita 384, 385
Ghasemi, Masoud 346
Ghasemi-Golezani, Kazem 234
Ghaseminejad, Pejman 115, 116
Ghasemiyan, Alireza 416
Ghasemnezhad, Azim 276, 278, 457
Ghasempour, Hamid Reza 96
Ghassempour, A. 367
Ghassempour, Alireza 363, 434, 469, 19
Ghazanfari, Tooba 355
Ghazian, Fatemeh 157
Ghaznavi, Mohammad 142
Gheisari, Sedighe 5, 69
Ghelich, Sima 25
Ghezel Sefli, Sogand 255
Ghiafeh Davoodi, Mehdi 282, 401
Ghobadi Far, Faranak 185
Ghobadi, Mohammad Eghbal 228
Ghobadiha, Farshid 173
Ghodarzvand Chegheni, Vali 87
Ghodrati Azadi, Hamideh 369
Ghods, Mahnaz 302
Gholamhosseinpour, Ziba 272, 276
Gholami Esfidvajani, Ali 258
Gholami, Ahmad 201, 217
Gholami, Aida 30
Gholami, Farzaneh 399
Gholami, M. 95
Gholami, Mansour 10
Gholami, Morteza 130
Gholami, Somayeh 115, 116
Gholami, T. 31
Gholchin, Ahmad 87
Gholipoor, M. 73
Gholizadeh Sarcheshmeh, M. 85
Ghomlaghi, Shadi 114, 73
Ghorbani Javid, Majid 138
Ghorbani, Ardavan 373, 374
Ghorbani, Masomeh 449
Ghorbani, Mehdi 448
Ghorbani, Reza 194
Ghorbani, Saeedeh 302
Ghorbani, Safoura 420, 421
Ghorbanli, Mahlagha 35, 36
Ghorbanpour, Mansour 78, 83, 91
Ghoreishi, Maryam 350
Ghuosta, Youbert 316
Godarzvand Chegini, Vali 28
Golafshan, Sina 45
Golchin, Ahmad 28
Golchin, Fatemeh 145
Golfakhrabadi, Fereshteh 165
Golian, Abolghasem 245, 360, 361, 375, 376



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Golipour, Mostafa 69
Golkar, Pooran 387
Golmohammadi, Farhood 446, 346
Golmohammady, Sh. 297
Golparvar, A 392
Golparvar, Ahmad Reza 70, 71
Goodarzi, F. 393
Goodarzvand, Majid 330
Gorbani, A. 149
Gorzi, Ali Reza 331
Goudarzian, Pardis 109, 121
Gruber, C. 367
Habib Zadeh, Mahboob 384, 359
Habibi Lahiji, Saeideh 207
Habibi Nokhandan, Mohsen 145
Habibi Tirtash, Farzaneh 230
Habibi, Ghader 396, 99, 124
Habibi, Hasan 173
Habibi, Ramin 449
Habibi, Yousef 320
HabibZadeh, Mahboob 417, 418
Hadavand Mirzae, Hossin 164, 367, 370, 367
Hadavi, Ebrahim 286
Hadi, Mohamad Reza 87, 88
Hadian, Javad 253, 250, 257, 259, 276, 278, 323, 330, 346, 370, 427, 430, 456, 457, 11, 12
Hadian, Shervin 148, 150
Hadipanah, Amin 70, 71
Hadipour, Mehdi 26
Hadj Seyed Hadi, Mohammad Reza 40, 39
Haghbeen, Kamahldin 185, 460
Haghi, Ghasem 155, 156, 157, 158, 167, 290
Haghi, Reza 420, 421
Haidari Davijani, Zahra 455
Haj Hosainy, Reza 468
Haj Seyed Hadi, Mohammad Reza 102
Hajbagheri, Sepideh 213
Haji Hosseini, Alireza 31
Haji Hosseini, Alireza 31
Haji Mohammad, Arghavan 352, 400, 95
Haji moradlu, Abdolmajid 222
Haji Vand, Shokrollah 87
Hajiaghae, Reza 265, 267, 268, 269
Hajian Nejad, Narges 381
Hajimahmoodi, Mannan 43
Hajimehdipoor, H 458, 459, 460
Hajizade, Saeede 269
Hajjar, Fatama 101
Hakimi, Laila 173, 265
Hakimizadeh, Elham 442
Hamdi, Mohammad Mahdi 300, 404
Hamed, Behzad 265, 267, 34, 35
Hamed, Shokouh sadat 279
Hamidi Nomani, Mostafa 392
Hamidi, Fattaneh 208
Hamidi, Zohreh 92
Hamidi-Esfahani, Zohre 251
Hamidiyan, Hedieh 423
Hamzelomoghadam, Maryam 46, 368
Hanachi, P. 110
Hani, Abbas 2887, 328
Harighi, Behrouz 244
Hasani, Abbas 414, 431, 433, 435, 445, 222
Hasani, Jamal 46
Hasani, Rahele 328
Hasanloo, Tahereh 335, 338, 340, 367, 164, 165
Hasannejad, Ali 163
Hasannejad, Zahra 163, 164
Hasanpouraghdam, Mohammad Bagher 11
Hasanshahi, Fatemeh 128
Hashem Dabaghian, Fattaneh 20
Hashemi Sheikh Shabani, Somayeh 337
Hashemi Sohi, Haleh 125, 180, 6
Hashemi, Mamak 142
Hashemi, S. R. 140, 141
Hashemi, Javad 415
Hashemian Ahmadi, Seeaid Hossein 52
Hasheminejad, Abbas 20
Hasheminejad, Roghaye 350
Hasheminia, Seyedeh Masoomeh 463, 464
Hashempour, Hossein 460
Hashempour, H. 367
Hashemzadeh, Fatemeh 48, 106
Hassan Barani, Masumeh 52
Hassan pour, Yahya 353
Hassanabadi, Maryam 228
Hassani, Abbas 316, 371, 386, 402, 414
Hassani, Batool 242, 246
Hassani, Mahmoud 197, 198
Hassani, Shokoufeh 43
Hassannejad, Marzieh 127
HassanNia-Khibari, E. 84
Hassanpoor, Leila 78
Hassanpour Asil, Moazzam 351
Hassanpour, Roghaye 424
Hassanzadeh Aval, Fatemeh 292
Hassanzadeh, Alireza 165
Hassanzadeh, Mustafa 331
Hassanzadeh, Maryam 255
Hassibi, Neda 29
Hatami, Ahmad 67, 101
Hatami, Alireza 155, 156, 158
Hatami, Mehrnaz 78, 83
Hatami, Seyede Fateme 427, 429, 430
Hayati, Parisa 372, 373
Hayati, Payam 372, 373
Hedayat, Mohammad 133, 134
Hedayati, Bahareh 384, 385
Hedayati, MH 459, 460
Hedayati, Nasrin 384
Heidari Nasirabadi, Mabubeh 351
Heidari, Fatemeh 362
Heidari, M.149
Heidari, Mehregan 30



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Heidari, Reza 50, 59, 103, 117, 239
Heidarzadeh, Soraya 112
Hejabi, Hadigheh 401
Hejazi, Fereshteh 311
Hejazi, Sara 204
Hekmati, Maryam 456
Helali soltan ahmadi, Fahimeh 235, 285
Helulbaigy, Yasin 409
Hemati, Helen 198
Hemmati, Khodayar 31, 365, 443
Hemmati, Nastaran 345
Hemmati, Yeghaneh 345
Heravi, Majid M. 141
Hesampoor, Ghasem 103
Hesamzadeh Hejazi, M. 2, 24
Hesari, N. 291
Heshmati, Javad 450, 16
Heydari Gharai, Hamideh 452
Heydari, Reza 342
Honarmand, Hamidreza 228
Honarvar, Mehrzad 304
Honermeier, B. 455
Honermeier, Bernd 331
Hooshmand, M. 356, 357
Hooshmandi, Mahsa 259
Hoseini hashemzadeh, Haleh 241
Hoseini Tafreshi, Sayed Ali 139
Hoseini, Mahdi 193
Hoseini, Kolsoum 354, 355, 444
Hoseini, Mahsa
Hoseini, Mohamadamin 451
Hoseini, Mostafa 183
Hoseini, Seied Amir 342
Hoseiny Nia, Ashraf 381
Hosseini Zadeh Namin, Monir 300
Hosseini, Ashraf 103
Hosseini Nezhad, Marzieh 301
Hosseini Sarghein, Siavash 339, 347, 348, 171
Hosseini Shahidi, Farnaz 154
Hosseini, Pantea 93
Hosseini, S.M. 84
Hosseini, Ali 55
Hosseini, Bahman 394, 402, 414, 440, 445, 222, 470
Hosseini, Hossein 156, 157, 167, 172
Hosseini, Maryam 130
Hosseini, Mehran 380
Hosseini, Ramin 384, 385
Hosseini, Seyed Ali 239
Hosseini, Seyed Ali Reza 170
Hosseini, Seyed Jaber 176
Hosseini, Zahra 201
Hosseini-Vashan, S.J.
Hosseinzadeh, S.M. 205
Hosseinzadeh, S. Mohammadjavad 233, 234, 339
Hosseinzadeh Namin, Monireh 228
Hosseinzadeh Namin, Pouyan 145
Hosseinzadeh Varjoui, Mehdi 272
Hosseinzadeh, Rahman 27, 28, 130
Hosseinzadeh, S. 356, 357
Hossenalizadeh, Mahboobeh 175
Hosseyni, Leyla 274
Hossieni, Bahman
Hossinezadeh, N. 147
Houshmand, Saadollh 221
Hyati, Sima 372, 373
Imanieh, Hossein 78
Inaloo, Alireza 403
Irankehah, Sirvan 429
Izadi Darbandi, Ali 284, 331, 332, 333, 334
Izadi, Marziyeh 294, 295, 296, 313
Izadi, Zahra 131
Izadkhan, Marzieh 243
Jaafar, Hawa Z.E. 50, 51
Jaafari, Nima 286
Jabbarzadeh, Sima 167
Jabbarzadeh, Zohreh 394
Jafari jaid, Abbas 359, 384, 417, 418
Jafari Ahangari, Yousef 353
Jafari, Morad 402
Jafari, Ali Ashraf 17, 284, 391
Jafari, Azarnoosh 300, 338, 404, 410
Jafari, Azizollah 448
Jafari, Bizhan 58
Jafari, Efat 64, 65, 67
Jafari, Elham 339
Jafari, Mohamad 170
Jafari, Samaneh 175, 377
Jafari, Zohreh 81
Jafarian, Zahra 108
Jafarkhani Kermani, Maryam 335, 338
Jafarpour, M 392
Jafary, Ali Akbar 468
Jafarzade Kenarsari, M. 143
Jafarzadeh, L. 27, 112, 362
Jafarzadeh, Leila 33, 118
Jahan, Mohsen 273
Jahanbin, Sharareh 128
Jahani, Maryam 44, 194
Jahanlu, AlirezaShahab 30
Jahedi Pour, Saeed 114, 151
Jaimand, Kamkar 112, 473
Jalaei, J. 356, 357
Jalali Honarmand, Saeid 228
Jalali, Ghulamali 116
Jalali, Mohammad 418, 451, 452
Jalali-Javaran, Mokhtar 310
Jalalpour, Zohreh 280
Jalili Marandi, Rasul 371
Jalilian, Nasrin 389
Jalilian, Nastaran 389, 423
Jalilvand, Mohammad Reza 378
Jalilzadeh Amin, Ghader 297, 226
Jamali Zavareh, Abdul Hussain 40, 41
Jamali, Salar 137



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Jamei, Rashid 50, 59, 192, 339, 342, 347, 348
Jamshidi, Mahboobeh 60, 61
Jamshidi, Marjan 261, 288
Jamshidi, Mitra 263, 299
Jamzad, Z. 2, 24
Jamzad, Ziba 23
Jangjou, Khadijeh 402
Jannat, Behrooz 43
Jassbi, Amir Reza 18
Javadian, Samar 185, 460
Javadipour, Zahra 69
Javadmoosavi, Bibi Zahra 335
Javadmoosavi, BZ.303
Javahery, Susan 222
Javanshir, Aziz 48
Javidnia, K. 95
Jebelli Javan, Ashkan 309
Jonaidi, Alireza 95, 352, 400
Joodi, K. 216
Julae Manesh, Nasim 170
Kabiri, Fatemeh 162
Kabiri, Rozita 156
Kaboli Boroujeni, Hossein 34, 35, 267
Kaboli, Zahra 43
Kafi, Mohammad 307
kahrizi, Denial 215
Kalafi, S. Y. 23, 24
Kalantari, Salma 63
Kalantari, Siamak 247, 248
Kalate Jari, Sepideh 377
Kalvandi, R. 2, 24
Kalvandi, Ramazan 23, 287
Kamali, Bahareh 365
Kamali, Hossein 378
Kamali, Sara 301
Kamalinejad, Mohammad 20, 213
Kamkar, Behnam 206
Kamrani, Asghar 139
Kamrani, Moharram 226
Kamyab, Maryam 177
Kanani, Mohammad Reza 344
Karagah, Amir Hosein 142
Karami, Akbar 391
Karamian, R. 214
Karamian, Reza 214
Karamian, Roya 195, 266
Karbalaee Mohammad, Niyousha 83
Karegar Hajiabadi, Elaheh 166
karimi, Farah 266
Karimi, Ghader 374
Karimi, Ahmad 449
Karimi, Amin 384
Karimi, Ehsan 276, 278, 457
Karimi, Farah 216, 266
Karimi, Isaac 423, 446
Karimi, Marzieh 3
Karimi, Neda 454
Karimian, Ladan 18
Karimi-Babaahmadi, Behnaz 352
Karimifar, Parastoo 401, 405
kariminik, Ashraf 136
Karimzadeh, Ghasem 310
Karkoodi, Keyvan 212
Kashan, Azadeh 235, 293, 336
Kashefi, Bahareh 302
Kasraii, Neda 249
Katooli, Nafiseh 369
Kavakebian, Mahdi 61
Kavand, Samane 457
Kaveh, Mona 218
Kavian, Mahbobeh 123
Kavianpoor, Husain 374
Kavusi, Mozghan 303
Kazem Souri, Mohammad 367
Kazemi Saeed, Farahza 223
Kazemi, Masoud 65, 72, 77, 77
Kazemi, Mohammad 252
Kazemian, Sahar 383
Kazemiani, Samaneh 445
Kazemitabar, Seyed Kamal 3
Kazemniya, Ali 79
Kazempour Osaloo, Shahrokh 3, 4, 148
Kazempour, Ali 160, 166
Kazerani, Hamid Reza 315
Kehtarpour, M. 303
Kehtarpour, Maryam 236, 335
Keihanian, Faeze 53, 330
Keneshloo, Hashem 349, 360
keshavarz, Narges 390
Keshavarzi, Maryam 230, 409
Kesmati, Mahnaz 119
Keyhanmanesh, R. 312
Keykha Akhar, Fatemeh 447
Khadem Ansari, Mohammad Hassan 127
Khadem mohammadi, A. 362
Khadvizadeh, Talat 42, 343, 344, 362
Khajehpour, Lotfollah 119
Khajoe nejad, Fatemeh 399
Khajoei nezhad, Vahideh 373, 374
Khakpour, Sakineh 222, 445
Khaleghi-Zadeh, M. 451
Khalesro, Shiva 146
Khaligh, Pooneh 13
Khalighi Cigaroudi, Farahnaz 38, 261
Khalighi-Sigaroodi, F. 352, 31
Khalighi-Sigaroodi, Farahnaz 13
khalili, Hamidreza 122
Khalili, Hossein 470
Khalili, Mojtaba 48
Khalilipanah, Fatemeh 17
Khalilisdarabad, Elham 351
Khalily, F. 392
Khanavi, Mahnaz 8, 175, 205, 217
Khanban, Mahdieh 66



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Khanjari, Ali 419
Khanpoor, Elham 86
Khanpour Ardestani, Narges 397
Khanzadeh, Hassan 57
Khatami, F. 1
Khavari-Nejad, R.A. 85
Khavazi, Kazem 83, 166
Khayati, Maryam 390
Khayatnouri, Mir Hadi 215
Khayyam Nekoei, Seyyed Mojtaba 164, 165
Khayyami, Masoud 192
Kheibari, Parviz 352
Kheiri, Farshad 350
Khodadoost, Mahmood 20
Khodaie, Somayeh 216
Khodaverdi, Masumeh 118
kholdebarin, Bahman 87, 88
Khoramdel, Surur 194
Khorrami, Mojtaba 237
Khorshidi, M. B. 216
Khoshbakht, Niloofar 231
Khoshnood Yazdi, Asghar 354, 355, 444
Khoshrang, Naghme 187
Khoshzaban, Fariba 12, 329
Khosravi, Sara 205
Khosravi, Esmail 265, 267-269
Khosravi, Mohammad Taghi 265, 267-269, 275, 377
khosravi, Sahar 205
Khosravitar, Fatemeh 16, 411
Khosromehr, Forough 300
Kiabi, Shadi 250
Kiani, Fatemeh 289, 290
Kianmehr, Mohammad Hossein 284
Kiashi, F. 398
Kodoori, Mohamreza 89
Kohandel, Asghar 13
Kohandel, A. 31
Kohanmoo, Mohammad Amin 131
Kohansal Vajargah, Fateme 288
Kohansal vajargah, Sekine 288
Köhbach, J. 367
Koochaki, Alireza 196
Koochani, Morvarid 52
Koocheki, Alireza 44, 63, 136
Koocheki, A. 455
Koochpayeh, Abed 97
Koolani motlagh, Negin 244
Koorepaz mahmoodabadi, Soheila 174, 353, 416
Kord, Maryam 192
Kordi, H 388
Kordnaji, Alaedin 135
Kordsardouyi, Habibe 149, 150
Korehpaz, Soheila 422
Kosari-Nasab, Morteza 9, 302
Koshani, Roya 292, 293, 341
Kudoori, Mohammad Reza 392
Lakzadeh, Leila 286
Lari yazdi. H 382
Larz Ghadiri, Maryam 38, 261, 287, 377
Latifi, Ali Mohamad 468
Layegh Haghighi, Masoumeh 161, 166, 168, 196
Lebaschi, Mohammad Hosin 21, 196, 252
Leilavi, Hadi 111, 281
Lotfi Jalal Abadi, Amin 201, 238, 203, 238, 313
Maassumi, A.A. 3
Madadzadeh, Nader 351
Madaieni, Mahdi 245, 360, 361
Mafakheri, Saeed 162, 166
Mafton Azad, Neda 82
Maham, Masoud 226, 297
Mahboobi, Hamidreza 30
Mahdavi Damghani, M. 457
Mahdavi Fikejvar, Edris 153
Mahdavi Nejad, Mehri 382
Mahdavi, Batool 1, 146
Mahdavi, Khadijeh 1
Mahdavi, M. 100, 254, 457
Mahdavi, S. V. 160
Mahdavi, Seyedeh Vahida 66
Mahdiye, Majid 318, 320
Mahjouri, Sepideh 9
Mahlouji Rad, Mansoureh 136, 196
Mahmodi, Bahram 189, 747, 475
Mahmodi, Sohrab 364
Mahmood, Alireza 86
Mahmood, Zokaei 422
Mahmoodi, Alireza 122
Mahmoodi, Fatemeh 420
Mahmoodi, Zaniar 212
Mahmoudi, Razzagh 372
Mahmoudi Najafi, S. Heydar 186
Mahmoudi, Reza 190
Mahmoudi, J. 254
Mahmoudi, Razzagh 272, 372, 381
Mahzooni-Kachapi, S. S. 100
Majd, A 445
Majd, Ahmad 94, 96, 138, 167
Majidi Dizaj, Hassan 145
Majidi, Eslam 91
Majnoon hossieni, Naser 83
Majrouhi, Ali Asghar 209
Makari, Samira 62
Makarian, H. 73
Makariyan, Hasan 217
Makhtoumi, Elham 354, 355, 444
Makizadeh, Maryam 240
Makkizadeh Tafti, M. 129
Makkizadeh Tafti, Maryam 46, 145, 223, 224
Malakottabary, Shabnam 35, 36
Malek Mohammadi, Mohsen 238
Malekaneh, M. 84, 380
Malekaneh, Mohammad 380
Maleki Mousavi Naraki, Mojgan 113
Maleki, Malihe 315



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Maleki, Parisa 123
Maleki, Saeid Abbasi 211, 215
Maleki, Vahid 286
Malekmohammadi Faradonbeh, Mohsen 203
Malmir Chegini, Mahsa 338
Mamouri, Mohamad Ali 381
Manayi, Azadeh 175
Mansoori, Irandokht 108
Mansoori, Sadollah 43
Mansouri, Hakimeh 193
Mansurifar, Sirus 228
Manzari Tavakkoli, Meysam 71, 72
Marashi, Seyed Hassan 209
Mardan, F. 260
Mardani, Hossein 76, 308
Marefatjoo, Javad 185, 460
Mari, Marta 200
Maroofi, Hosein 316, 364, 466
Martin, Raul López 128
Maryam Larz Ghadiri 38, 261, 287, 377
Mashayekhi Sardooyi, Asma 54
Mashayekhi, Sepideh 228
Mashhadi, Alireza Abdali 201, 203, 236, 238, 313
Mashmoul, Ali 433, 435, 440
Masoud Sinaki, Jafar 197
Masoumiasl, A. 98
Matin, Maryam M. 16, 411
Matinizadeh, Mohammad 302
Mazaheri, Dariush 111
Mazandarani, Masoumeh 62, 178, 198, 283
Mazandarani, M. 210, 241, 337
Mazoochi, Asma 8, 233, 246, 395, 475, 476
Mazooji, Ali 209, 311
Meghdadi, Nasim 206
Mehbod, Amir Ali 30
Mehdipour, Zohreh 177, 385
Mehdizadeh, Tooraj 407
Mehmannavaz, Hamidreza 369
Mehraban Sang Atash, Masoumeh 7, 168
Mehrabani Mitra 182, 248
Mehrabian, Seddigeh 167
Mehrafarin, Ali 38, 261, 262, 265, 267-269, 275, 277, 287, 326, 377, 438
Mehran, Poian 157
Mehran, Mehdi 155, 156, 158
Mehrannia, Kobra 427
Mehrnia, Mohamad 231
Mehrpouyan, Mehdi 51
Meimandi, Katayoun 247
Meisam, Golparvar 158
Memariani, Zahra 279
Merikhi, Mohammad 120
Mesbah, Alireza 330
Mesgarian, Nafiseh 159
Mesri, Fatemeh 58
Miahi, Mohammad Mahdi 1, 405
Midani, A.R. 204
Mighani, Hossian 182, 183
Mikaeili, Ali 423
Milani Kalkhorani, Nasim 141
Mina Ghazaeian 76
Minab Poodineh, Hadi 346
Minoo Ilkhanipoor 103
Minooei Moghadam, Javad 49, 115
Miran, Mansour 471
Mirhadi, Mohammad Javad 204
Mirhashemi, Seyedeh Maliheh 292
Miri, M.R. 84
Miri, R. 95
Miri, Seiid Mehdi 338
Miri, Yasamin 408
Mirjalili, Mohammad Hossein 11, 15, 253, 323, 330, 346, 367, 469
Mirjalili, Seyed Abbas 396
Mirlohi, AghaFakhr 349
Mirmasoumi, M. 256, 298
Mirnezami, Tahmineh 175
Mirshekari, Bahram 106
Mirtadzadini, Mansour 148
Mirtalebi, Abtin 379
Mirza, M. 24
Mirza, Mehdi 32, 68, 69, 95, 352, 400
Mirzaei Babil, F. 312
Mirzaie-Nodoushan, Hossein 349, 360
Mirzajani, Fateme 19, 425
Mirzanejad, S. 160
Mirzanejad, Sepideh 66
Mirzania, Forough 472
Moallemi, Razieh 364
Moarefian, Mostafa 38
Moattar, Fariborz 89, 211
Moayedi, Fatemeh 292, 293, 341
Mobarak Qamsari, Maryam 189, 395, 474
Mobarak, M. 217
Mobli, Masoumeh 279
Modarres Sanavy, Seyed Ali Mohammad 146
Modarresi, Masoud 389, 423, 446
Moein, Mahmood Reza 278
Moeini, Ahmad 162
Moghaddam, Ghazaleh 43
Moghaddami, Farnaz 398
Moghaddasian, Behanz 328, 405
Moghbali, Ecehagh 182-184
Moghimian, Reza 171
Moghtader, Mohammad 47
Mohabatkar, Hassan 105
Mohaddes, Naimeh 241
Mohadjerani, Maryam 27, 28, 130, 153, 161, 208
Mohager, Mokhtar 432
Mohagheghzadeh, Abdolali 96
Mohajeri Naraghi, Sepehr 335
Mohajeri, Farhad 354
Mohajjel shoja, Atefeh 11
Mohamadbeighi, Reza 307



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Mohamadi goltape, Ebrahim 221
Mohamadi nejad, Ghasem 316
Mohamadi, Somaeah 221
Mohamadi, Siavash 152
MohamadModares Sanavi, Seyd Ali 135
Mohamdzadeh, Azadeh 159
Mohammad Taghizadeh-Kashani, Leila 30, 123, 187, 322, 454
Mohammadabadi, Tahereh 436-439
Mohammadalipour, A. 199, 200
Mohammadi Alborzi, Mahboobeh 197
Mohammadi Far, Mehrnoush 331
Mohammadi Sani, Ali 419
Mohammadi, Parisa 194
Mohammadi, Elham 53
Mohammadi, Manizhe 50
Mohammadi, Masoomeh 262
Mohammadi, Samane 107
Mohammadian, A. 214
Mohammadian, Ali 214
Mohammadian, Zianab 447
Mohammadifar, Shamameh 75
Mohammadi-Nejad, Ghasem 387
Mohammadkhani, Abdul Rahman 41
Mohammadkhani, Nayer 239
Mohammadpour, Mehran 49, 52, 115, 172
Mohammadzadeh tutunchi, Payman 285
Moharrami, Leila 414
Moharramipour, Saied 49
Moharramnezhad, Sajjad 99
Mohkami, Khodayar 345
Mohsennezhad, Fatemeh 318
Mohsenzadeh, Sasan 105, 119
Mohsenzadeh, R. 147
Mohtaram, Seyed Alireza 395
Mojab, Faraz 18, 468, 469
Mojahedian, Mohammad M. 96
Mojarrad, Mehran 461, 464
Mokhtari, Tahere 394
Mokhtarian, Ali 191
Molafilabi, A. 206
Molani, Abobakr 282
Molki, Mandana 344
Mollashahi, M. 303
Mollashahi, Mahtab 236, 335
Mollayi, Saeed 363
Momeni, Lida 425
Momeni, Maryam 337
Monazam, Keyhan 148, 150, 369
Moonesi Shabestari, A. 152
Moonesi Shabestari, Abbas Ali 202
Moosavi Bibi Zahra, Javad 236
Moosavi-Nasab, Marzieh 292, 293, 341
Moradi, Pezhman 207
Moradi Moein, Maryam 263
Moradi, Maria 316
Moradi, Mehdi 152
Moradi, Mohammad 376
Moradi, Narges 284, 333, 334
Moradi, Pejman 90, 207, 265, 328
Moradi, Rezvan 442
Moradi, S. 113
Moradian, Fatemeh 84
Moridi Farimani, Mahdi 20, 433, 471, 472
Moridi, Tahereh 43
Morshed Shekarchi, Hanieh 190
Morshedi, Dina 135
Morshedloo, Mohammad Reza 139
Mortazaeinezhad, Forough 291
Mortazavi, Ali 39
Morteza, Elham 252, 257
Mortezapour, Hamed 370
Mosaddegh, Mahmoud 46, 368
Mosafa, L. 54
Mosavi, Saeeyde Zahra 211
Mosavizadeh, A 216
Mosazade, Saeid Ali 35, 36
Moshiri, A 199, 200
Moshrefi, Mandana 279
Moshtaghi, Nasrin 447
Mosleh, Zohreh 70
Moslemie, M. 143
Moslemzadeh, Hemmat 297
Mostofi, Yones 258
Motaffaf, M. 238
Motaghinajad, Ozra 93
Motaghinejad, Majid 93
Motahari, Bahamin 97
Motallebi-Azar, Alireza 222, 445
Motamedi, Hossein 111, 163, 164
Motamedi, Mohammad 218
MotevaliZadeArdekani, Ali 142
Mousavi, Amir 6
Mousavi, H. 398
Mousavi, S. H. 353
Mousavi, Seyed Latif 266
Mousavi, Seyed Zahra 172
Mousavi-Nik, Seyed Mohsen 428
Movafeghi, Ali 9, 63, 118, 302
Movahed, Sara 463, 464
Movahedi Dehnavi, M. 29, 98
Movahedi Dehnavi, Mohsen 133
Movahedpoor, Afshin 264
Movahedpour, Mohammad Mahdi 395
Movahedi Dehnavi, Mohsen 5, 132
Movassaghi, A.R. 366
Mozaffari, Tayebe 290
Mozaffarian, V. 5
Mumivand, Hasan 370
Murata, Jun 102
Nabavi Kalat, Seyyed Mohsen 218
Nabizadeh, Hossein 226
Naddafi, Maede 66
Naderi, Fariba 357



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Naderi, Rohollah 122
Naderi-Hajibagher kandi, M. 107
Nadi, R. 149
Nadjafi, F. 455, 457
Nadjafi, Farsad 12, 219, 323, 330
Naeini, A. 106
Naghavi, Mohammadreza 91
Naghdi Badi, Hasanali 38, 261, 262, 277, 287, 319, 377, 407
Naghbi, Majid 289
Nahardani, Monireh 301
Nahidian, Bahareh 142
Naiini, Alireza 12, 329
Najafi, F. 85
Najafi, Farzad 45, 220, 284, 334
Najafi, Fatemeh 337
Najafi, Gholamreza 65
Najafi, Nosratollah 234
Najafian, Ahmad 45
Najafian, Bita 462
Najafian, Sharareh 341
Najafpour Navaei, Mehrdokht 68, 69
Namazi, Nazli 16, 450
Namjo, Najmeh 286
Naqinezhad, Alireza 27, 28, 153
Narouei, Saeid 304
Naseri, Mohsen 20, 213, 314
Naseri, Gholamreza 229, 230, 213, 214
Naseri, Mohsen 20, 213, 314
Nasibi, Fatemeh 156, 193
Nasiri Mahallati, Mahdi 273
Nasiri, Mohsen 46, 240
Nasiri, Nasibeh 364
Nasiri, Yousef 234
Nasirzadeh, Abdolreza 82
Nasri, Sima 68, 73, 114, 127, 178, 179, 306, 388
Nasri, Zarrin 273, 310, 430
Nasrolah Zade, Safar 253, 254
Nasrolahi, Ozra 117
Nasrollahzadeh, Safar 234
Nasseri, A. 216
Nasseri, Mohammad Ali 379, 380
Nassiri Mahalati, Mehdi 44, 314
Naybandi atashi, Sahar 39
Nayebi, S. 445
Nazari, Yaser 249
Nazarizade, Hasan 425
Nazem, Shima 298
Nazemiyeh, H. 312
Nazemiyeh, Hossein 9
Nejad Ebrahimi, S. 457
Nejad Ebrahimi, Samad 471, 472
Nejad Farajivand, Zahra 371
Nejad Sattari, Taher 96
Nejati, Vahid 103
Nemati, F. 160
Nemati, Ghazal 309, 419
Nemati, H. 50, 51
Nemati, Seyed Hossein 327
Neyestani, Elyas 232
Nezami, Esmail 384, 385
Nezami, Somayyeh 327
Nezhad Neysi, Saedeh Hassan 236
Niakan, Mohammad 376
Nickavar, Bahman 18, 163, 179
Nickhah Basti, Amin 422
Nikbakht Rayeni, Hamideh 418, 451
Nikeghbal, Saeed 342
Niknam, V. 256
Niknejhad, Y 406
Nikzad, Maryam 30, 123, 187, 322, 454
Noeinesfahani, B 382
Noorabadi, Alireza 285
Noori, Mitra 318, 320, 321, 449
Noorollahi, Zohre 144
Noroozian, Ali 270
Norozi, Roghaye 318, 320
Nosratpour, Soma 272, 372, 381
Nourani, S. S. 254
Nouri, Abdorahim 7
Nourimand, Maryam 105
Nourmohammadi, Ghorban 204
Nourouzi, Zahra 416
Nourzad, Soudabeh 242
Nuhi, S. 160
Nvrzvnzhad, Mohammad Javad 237
Oladzad, Atena 78, 326
Olanj, Nayyereh 361
Olfati, Jamalali 182, 183
Oloumi, Hakimeh 29
Oloumi, Kaveh 57
Omidbaigi, Reza 121, 472
Omidi, H. 27, 362
Omidi, Heshmat 33, 112, 118, 262, 319, 321
Omidi, Mansour 78, 83, 91, 438
Omidvar, Atefeh 317
Omranpoor, Marjan 9
Oryan, A. 199, 200
Osanloo, Zahra 403
Osfoori, M. 238
Otroshy, Mahmoud 415
Oveisi, Mohammad Reza 43
Owlia, Parviz 19, 336
Ownagh, Abdolghafar 45, 79
ÖZgüven, Menşure 245
Padidar, Marjan 255
Padidar, Nazanin 255
Pahlevani, Amirhossein 175
Paknejad, Farzad 161, 168
Pakravan Fard, Manizheh 390
Pakravan, Maneezhe 175, 322, 390, 406
Pakravan, Mina 374
Panahi, Bahman 89
Panahi, N. 356



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Panahi, Y. 306
Papzan, Abdolhamid 347
Parastar Gharelar, Mahmood 56
Parisa Tousi 128
Parsa Motlagh, Bahareh 54
Parsa, Eslam 68, 240
Parsa, M. 296
Parsaeian, Mahdieh 309, 323, 400
Parsaeimehr, Ali 185
Parsia, Paria 136
Parvianian, Sepideh 125
parviz, M. 80
Payez, Atefeh 142
Payroodin, Kazem 376
Pazooki, Alireza 275
Pezeshkpour, P. 143
Pichkah, Morteza 257
Pirali kheirabadi, Khodad 351
Pirdashti, H. 406
Pirdashti, Hematallah 52, 176, 235, 293, 336, 424
Piree, Morteza 319
Piri, Khosrow 264
Pirmohammadi, Rasoul 80
Pirouz, B 458
Pirzad, Alireza 433, 435, 440, 441
Poorakbar, Latifeh 201
Poorazizi, Elahe 396
Poordahandeh, Uranus 178, 179
Poorsaeed Esfahani, Fatemeh 177
Pordigooi, Mozafar 366
Pourali, Masoud 184
Pouramini, Pouneh 173
Pourbahaaddiny Zarandy, Narjes 299
Pourbarat, Fateme 194
Pourfarzaneh, Talayeh 209
Pourmaidani, Abbas 269
Pournaghi, Narges 235
Pourreza, Javad 424
Pourseyedi, Shahram 249
Poryouse, Majid 111, 315, 397, 403
Pouya, Mehrdad 10, 347
Purabass khiavi, Leila 240
Purhematy, Amin 279
Pursaeed, Fateme 258
Qaderi, Ardeshtir 269, 326, 438
Qaderi, Azadeh 438
Qamsari, Maryam Mobarak 189, 395, 474
Qasemnejad, Azim 31
Qhajeshakohi, Mohammad Ali 220
Qomi, Mahnaz 172
Qorbani, Rasul 222
Rabiei, Zahra 176
Radan, Mohammad Reza 442
Radjabian, Tayebbeh 112, 139, 182, 300
Radmanesh, Fatemeh 243
Raeini-Sarjaz, Mahmoud 91
Raeisi, Abdol Shakoore 186
Raeisi, Safiallah 12, 323
Rafati, Hassan 7, 233, 235, 462, 466
Rafiee, Gh.R. 110
Rafiee, Hamed 448
Rafiee, Hanieh 38, 115, 116, 261, 377
Rafieiolhossaini, Mohammad 70
Rahaee, Jamileh 319
Rahamani, Ahmad 32
Rahbar, M 459
Rahbar, Nasrollah 369
Rahdari, Parvaneh 176
Rahdary, P. 151
Rahemi, Majid 151
Rahimi, Asghar 111
Rahimi, N. 393
Rahimi, Abdol Rahman 283
Rahimi, F. 356
Rahimi, Mohammad 181, 186
Rahimi, N. 393
Rahimi, Touraj 168
Rahimifard, N 458-460
Rahimzade Khoyie, Farrokh 106
Rahimzaheh, Elham 439
Rahmani, Fatemeh 117, 350
Rahmanian, Mahdi 427, 429, 430
Raisi Dehkordy, Samira 265
Rajabian, Majid 124
Rajaii, Hoda 309
Rakhshandeh, Hasan 344
Rakhshanipour, Golin 446
Rakhshanipour, Saeed 446
Ramak, Parvin 4
Ramezan, Ghazaleh 176
Ramezani, Nasrin 371
Ramin, Ali A 429
Ramroodi, Mahmood 181, 186
Ramshini, Hossein Ali 333
Ranjbar-Ghrache, J. 451
Raouf Fard, Fatemeh 472
Rashidi, Ali 30
Rashidi, Ali Reza 208
Rashidi, Varahram 48
Rashtian, Azar 1, 408
Rasooli, Iraj 2, 19
Rastee, S. 112
Rastegar Moghadam, Hamideh 371
Rastegari, Nowzar 296, 313
Rastegari, Sasan 294-296
Rastgar, Mehdi 456
Razaghi, Keyvan 287
Razaji, Azadeh 56
Razavi, Khadijeh1
Razavi, Seyed Hamid 346
Razavi, Seyed Mehdi 373, 401, 416, 417
Razavizadeh, Lila 75
Rejali, Farhad 39, 40, 131, 221
Resani, Ali Allah 379, 380



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Reyhani, Mitra 187
Rezadoost, Hassan 469
Rezaee Shahraki, Javad 163
Rezaei, Ayatollah 4, 104, 109, 110, 126, 263, 299
Rezaei, Bentolhoda 462
Rezaei, Mansour 389
Rezaeian, Abbasali 305
Rezaie, Fatemeh 259, 260
Rezaii poor, Mohamad Taghi 329
Rezaii, Rasol 467
Rezayatmand. Z 382
Rezazadeh, F. 100
Rezazadeh, Shamsali 83
Rezvani Moghadam, P. 455
Rezvani Moghaddam, Parviz 114, 219, 270, 271, 314
Rezvani, Nasim 435
Riahi, Hossein 362, 399, 461, 462, 466
Riahi-Madvar, Ali 259, 260
Riazi, Gholamhossein 102
Rooin, Zeynab 351
Roghani Dehkordi, Farshad 191
Roghani, Mehrdad 178, 188, 190-192
Ronagh, Nafiseh 351
Roohbakhsh, Ali 382
Roosta, Hamid Reza 71, 72, 255
Roosbeh-Nasira'ei, L. 100
Roshan Pajouh, Afsaneh 327
Roshan, Vahid 170
Rostami Ahmadvandi, Hossein 215
Rostami, Roohallah 287
Rostampour Vajari, Mohammad 53
Rouhani, Mohammad 53, 63
Roustaeifar, Ali 414, 433, 440
Rowshan, Vahid 82, 86-88, 101
Saadati, A.r 378
Saadati, Nasim 3
Saadatmand, Mahshid 274, 275, 408, 415
Saberian, Hamed 251
Saboora, A. 110, 296
Saboora, Azra 117, 194
Saboori, Meisam 12, 329
Sabouni, Farzaneh 185, 198, 460
SabzAli, Azadeh 115, 116
Sabzalian, Mohammad Reza 349
Sabzi, Mohsen 302
Sadeghi, Amin 244
Sadeghi, Amir Saeed 16, 460
Sadeghi, Ghorbanali 449
Sadeghi, Hamid 237
Sadeghi, Heshmatollah 391
Sadeghi, Naficeh 43
Sadeghi, Tahere 193
Sadeghian, Sara 67
Sadeghizade, Majid 298
Saderi, Horieh 19, 236
Sadin, Rasool 332
Sadrabadi Haghghi, Reza 289
Sadrabadi, R. 206
Sadraei, javid 55
Sadri-Majd, Zeinab 182
Sadrzadeh Aghajani, Fatemeh 293
Saeedan, Anoosha 272, 372, 381
Saeedi, M. 353
Saei, Ali 26
Saei-Dehkordi, S. Siavash 352
Saeidinia, Amin 330
Saeidnejad, Amir Hossein 307, 308
Saeidynia, Amin 53
Safae, Hosein 183
Safaei, Alireza 155
Safaei, Leili 42
Safaeian, R. 113
Safaian, Shila 35, 36
Safaie, Naser 200
Safapour, Shohreh 312, 402
Safari, Masumeh 8
Safari, Omid 7, 168
Safari, Taha 431
Safavi, Kamran 255
Saffari, Mehry 202, 203
Saffari, Roy 316
Safikhani, Keivan 23
Safikhani, Fazlollah 197
Safikhani, K. 2, 24
Saghi, Gholamhosein 189, 475, 476
Sahabi, Hossein 114, 219, 220
Sahari, Mohammad Ali 60, 61, 144, 149, 150
Saharkhiz, Mohammad Jamal 120, 256, 257, 259, 292, 293, 341, 354, 413
Sahraroo, Amir 467
Sajedi Moghadam, Soodeh 275
Salahi, Ali 229, 230
Salari, Aezam 182, 183
Salari, Fatemeh 193, 428
Salari, Hassan 47
Salari, Maliheh 428
Salaripoor, S. 445
Salatin, M. 129
Salavati, Masumeh 312
Salehi Eskandar, Behrooz 155
Salehi Sardoei, Ali 184
Salehi Surmaghi, Mohammad Hosein 184
Salehi, Amin 154
Salehi, Mansoureh 394
Salehi, Mohammad H. 70
Salehi, Parvin 178, 179
Salehi, Peyman 364, 421, 425, 433, 460, 466
Salimi, Ata 470
Salimi, Azam 86
Salimpour, Fahimeh 209
Salmasi, Saeed Zehtab 253, 254
Samadi, Hosein 319
Samadi, Abbas 431
Samadi, F. 140, 141



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Samadi, Sareh 14, 142
Samari Khalaj, Masume 92
Sami, Masoud 177, 385
Samie, Alireza 188
Samie, MA. 393
Samiei, Mohammad Ali 379
Samih, Mohammad Amin 53, 294, 295
Samira, Garazhyan 422
Samjari-Sarjaz, Reza 91
Sanavi-Shiri, H 451
Sanaye, Hamidreza 272, 276
Sanjarian, Forough 180
Saraei, P. 393
Saranjam, Dawood 174
Saremi, Sirous 118
Sarghein, Siavash Hosseini 339, 347, 348
Sari, Mohsen 437
Sarihani, Hassan 10, 153
Sarir, Hadi 243
Sarvestani, Vahid Rooshan 391
Sasanihoma, Rezvaneh 10
Satake, Honoo 102
Sattari, Morteza 38
Sayedipour, Sayedeh Sana 345
Sebt Ahmadi, Seyedeh Rezvan 281
Sedaghatoor, Shahram 33
Seeifi, S. 210, 241
Sefidkon, F. 107, 225, 358
Sefidkon, Fateme 2, 21, 146, 166, 290, 316, 371, 472, 473
Seifi, S. 337
Seifi, Salime 283
Seifshahandi, Mehdi 319, 321
Seifzade, Said 56
Şekeroğlu, Nazım 245
Semyari, Hassan 336
Sepahi, Ehsan 450
Sephrifar, Roshanak 335, 340
Sephidkon, Fatemeh 154
Seraji, M.R. 147
Seyed Hasan Tehran, Sahar 337
Seyed Hashtroudi, Mehri 434
Seyed Sharifi, Raouf 36
Seyyed Akhlaghi, S.J. 23
Seyyed Nezhad, Mansour 236
Seyyednejad, Seyyed Mansour 111, 163, 164, 281
Shabani, Leila 227, 251, 280
Shabani, Salimeh 171
Shabanzadeh, Shamide 231, 232
Shadi, Asieh 256
Shafaati, Fatemeh 424
Shafaroodi, Hamed 125
Shafiee Adib, Shahla 135
Shafiee, Kosar 312
Shafiezadeh 297
Shahbazi, Atefeh 423
Shahbazi, Kamal 57
Shahbazi, Maryam 308
Shahbazzadegan, S. 343
Shahdadneghad, Mozhgan 184
Shahgholi, H. 73
Shahgholian, Nahid 375
Shahidi, Vafa 89, 274
Shahriari Ahmadi, Farajollah 450
Shahrokhaby, Khadigeh 410
Shahsavani, D. 366
Shakeri, Alireza 219, 220, 282
Shams Ardekani, Mohammad Reza 175
Shams, Hoda 319, 321
Shamsi, Hossein 395
Shamsizadeh, Ali 365, 442
sharafi, Ali 6, 125, 180, 470
Sharafi, Ebrahim 164, 165
Sharayei, Parvin 465
Shariatmadari, Zeynab 399
Shariatpanahi, Seyyed Nima 30, 123, 187, 322, 454
Shariat-panahi, Shamsa 20
Sharifi Ashoorabadi, Ebrahim 42, 46
Sharifi Bigy, Saeideh 379, 380
Sharifi Shaygan, Mohsen 372, 373
Sharifi Tehrani, Majid 88
Sharifi, Mozafar 4, 102, 104, 146, 263, 310, 345, 397, 472
Sharifi, Jafar 318
Sharifi, M 470
Sharifi, Sara 96
Sharififar, Fariba 279
Sharifisirchy, Gholam Reza 177
Sharifi-Tehrani, Majid 280
Sharifnia, Fariba 52
Sharifzade, Kamal 59, 74
Sheikhi, Maedeh 161
Sheikholeslami, Zahra 282
Shekari, Farideh 38, 261, 277, 287
Shenavaii, Masoome 381
Shirmohammadi, Reza 447
Shirpoor, Rasol 127
Shirpoor, S. 27
Shirzad, Meysam 30, 123, 187, 322, 454
Shirzad, Azade 394
Shohrati, Majid 462, 468
Shojaefar, Samira 349
Shojaei, A. 95
Shojaeinia, Elham 322
Shokrani, Fahime 440, 441
Shokri, M. 110
Shokrpour, Majid 247, 248
Shooshtari, Lia 78, 91
Shoushtari, Abdol-hamid 249, 250
Shrifi Sirchi, Gholamreza 82
Siahmarguee, Asieh 44
Siahpoosh, Amir 165, 444
Sistanian, Armin 383
Slimi, A. 391



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Smaielpour, Behrouz 427, 429, 430
Sobati, Z. 151
Sohrabi, Mohamadreza 435
Solati, Amirali 90, 212
Soleimani, A. 304
Soleimani, S.304
Soleimany, Mahla 410
Soleymani Monfared, Peyman 3
Soleymani, Niloufar 81
Soltanbeigi, Amir 245
Soltani, Mohammad Fazel 180
Soltanian, Hadi 183
Soltanipoor, Mohammad Amin 181, 472
Sonboli, Ali 15, 116, 361, 390, 421, 425, 432, 460, 461
Soroosh zadeh, Ali 138, 319, 435
Sotodeh karimzadeh, Saba 155
Sure, Shirzad 59, 60, 74, 144
Tabae Aghdae, Sayed Reza 32, 153, 456
Taban, Azin 256, 257
Tabandeh, M. R. 199, 200
Tabatabaei-Naeini, A. 199
Tabatabaie Yazdi, Farideh 39
Tabiei, Hossien 237
Tabrizi, L. 457
Tabrizi, Leila 152
Tabrizi, Saeed Moghadami 336
Taghavi Takyar, Galin 359, 384, 417, 418
Taghi Darzi, Mohammad 39, 40, 102
Taghipor, Lila 372, 373
Taghipour, Zahra 225
Taghizade, M. 306
Taghizade, Masoud 112, 266
Taghizadeh, Akbar 80
Taghizadeh, Massoud 112
Taghizadeh, Mohammad Sadegh 122
Taghizadeh, Mohsen 290
Taghizadeh, MS 86
Taghizadeh-Kashani, Leila Mohammad 30, 123, 187, 322, 454
Taheri, Ghadir 317
Taheri, Sahar 90
Taheri, Seyed Abolfazl 269
Taherian, Niloofar 377
Taherinia, Mohammad Hosein 437, 439
Taherpour, Kamran 208
Tahmasby, Hossein34, 35, 267
Tahmasebi Notarki, Elaheh 37
Tahmasebian, Saeed 337
Tajaddod, Golnaz 311
Tajalli, Faezeh 419
Tajbakhsh, Mahmood 27, 28
Tajik, Hossein 407
Talebpour, Amir Hossein 63, 118, 302
Taleghani, Akram 471
Tamartash, Reza 127
Taran, Marzie 368
Tarighi, Saeed 450
Tarinejad, Ali Reza 106
Tatian, Mohammadreza 127
Tavakkoli, Akbar 138
Tavakkoli, Meysam Manzari 71, 72
Tavakoli, Saeed 8, 205, 217, 234
Tavakoli, Afshin 315, 411
Tavakoli, Hossei 31
Tavakoli, Rahmatollah 27, 28, 130
Tavakoli, Saeed 8, 205, 217, 234
Tavakoli-far, Bahareh 128
Tavasoli, Akhtar 218, 406
Tavassoli, Abbas 90
Tavatli, Sarah 195, 266
Tayarani, N. Z. 353
Tehranipour, M. 303
Tehranipour, Maryam 335
Teifori, Shadi 379
Teimori, S. 203
Teimuri, Fatemeh 72, 77
Thamasebi Enferadi, Sattar 337
Toorchi, Mahmoud 119
Torabi, Ali Reza 316
Torabi, Firoozeh 94, 138
Torabi, M. 152
Torbati Nejad, Mohammad 353
Torbatinejad, Nour Mohamad 432
Vafabakhsh, Javad 412
Vafadar, Farinaz 415
Vafaei, Ghazaleh 286
Vafaei, Moujan 111, 281
Vahdani, Masood 12, 329
Vakili, Reza 245, 264, 360, 361, 375, 376
Vakilishahrbabaki, Mohammad Ali 274
Valian, Mahdi 134
Valimehr, Sepideh 6, 125, 180
Valimohammadi, Frmisk 234
Valipouraghdam, Fahimeh 79
Valizadeh, Hassan 432
Valyaie, Akram 202
Varasteh Kojourian, Maryam 16, 411
Varzandian, Sara 50
Vaziri, Zahra 411
Vazirian, Mahdi 175
Veisipou, Elham 443
Yadavi, Alireza 132
Yaghini, Hamid 132
Yaghobian, Yaser 132, 176
Yaghoobi, Mohammad Mehdi 184, 247, 258, 311
Yaghoobi, Reza 444
Yarnia, Mehrdad 48, 106, 336, 363
Yasan Bangash, Mohammad 93
Yassa, Narges 8, 205, 217
Yavari, Alimohammad 431
Yazdanbakhsh, Zahra 409
Yazdani, Darab 139
Yazdizadeh Shotorbani, Narmin 59
Yegane, Hasan 374



National Congress on Medicinal Plants
16, 17 May 2012
Kish Island



- Yeghaneh, Sakineh 123
Yekefalah, Leili 193
Yektapour, N. 298
Yosefi, Kobra 259, 260
Yousefi Mask, Hamid Reza 243
Yousefi, Alireza 397, 403
Yousefi, Mehdi 274
Yousefi-Azari, P. 31
Yousefpor, Zeinab 113
Yousefzadi, Morteza 216, 344, 362, 448, 461
Yousezadeh Boroujeni, Laleh 130
Yousofi, Nariman 75
Youssefi, Morteza 208
Zabihnia, Atefeh 289
Zadehbagheri, Masoud 37
ZadehOmran, Hasan Mehdi 142
Zaghi, Danial 453
Zaker Tavallaie, F. 353
Zaker Tavallaie, Fatemeh 37
Zakerain, Abdolrasol 101
Zakeri, Ali 359, 384, 417, 418
Zakeri, Elham 177
Zali, S. H. 254
Zamani, Abbas Ali 249
Zamani, Hossein 330
Zamani, Seyyed Moeinedin 169
Zamani, Zabihollah 258
Zamindar, N. 54
Zanganeh, E. 256
Zarafshar, Mehrdad 116
Zardari, Sanaz 253, 254
Zardoshti, Mohammad Reza 440, 441
Zare Dehabadi, Saeid 248-250
Zare Khafari, Asieh 10
Zare, Nasser 225
Zare, Abase 371
Zare, Amir reza 326
Zare, Habibeh 25
Zare, Khadijeh 9
Zare, Payman 272, 372, 381
Zare, Yasser 422
Zarei, Mehdi 120
Zarei, Navid 264
Zarei, Gholamreza 395
Zarei, Mehdi 272, 276
Zarei, Ozra 311
Zarei, Z. 356, 357
Zargaran, Arman 96
Zargari, K. 291
Zarghami Moghaddam, Parastoo 62, 198
Zarghami, R 291
Zarinkamar, F. 470
Zarinkamar, Fatemeh 25
Zarshenas, Mohammad M. 278
Zavarshani, M. 451
Zebarjadi, Alireza 96
Zehtab-Salmasi, Saeid 234
Zeighamy, Maryam 299
Zeinali, A. 296
Zeinali, Hossein 42
Zeinali, Mir Aliasghar 384, 417
Zeinali, Zeinab 178, 283
Zeraatgar, Hadi 76
Ziaee, Esmail 292, 293, 341
Ziaee, Masumeh 49
Ziaei, Mohamad 408
Ziarati, Parisa 83, 172
Ziaratnia, Seyed Mahdi 76, 209
Zokaei, Mahmood 338, 403
Zolfaghari, Mohamed-Reza 198, 321
Zolfaghari, Roghayeh 169, 170
Zomorodian, Kamiar 257
Zonouby, M. 392