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# **Oral Presentation**

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## Nature as Source for New Hit and Lead Compounds

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The treatment of inflammatory disorders in Western medicine relies heavily on the use of non-steroidal anti-inflammatory drugs (NSAIDs) and corticosteroids [1]. However, currently available treatment options are often unsatisfactory. Natural products (NPs) have always been an important source of new drug leads. Almost half of the drugs currently in clinical use are of natural product origin and even today, in the post genomic era, plants, fungi, marine organisms, and microorganisms are still an important source for the development of new drugs [2].

In the course of a national research network project, we aimed to identify and characterize anti-inflammatory NPs capable to combat inflammatory processes specifically in the cardiovascular system. The combined use of computational techniques with traditional knowledge, high-tech chemical analysis and synthesis, and a broad range of in vitro, cell-based, and in vivo pharmacological models led to the identification of a series of promising anti-inflammatory drug lead candidates. Mechanistic studies contributed to a better understanding of their mechanism of action and delivered new knowledge on the molecular level of inflammatory processes. Highlights of this interdisciplinary project will be presented.

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**Keywords:** Natural products, Hit compounds, Inflammation

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## New Perspectives in the Analysis of Medicinal and Aromatic Plants, applying Spectroscopic Techniques - Opportunities and Limitations

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Quality control of medicinal and aromatic plants as well as products derived from them usually comprises correct botanical identification of the plant material as well as quantification of the individual active principles. For this, testing of plant material such as phytopharmaceutical products is usually performed in accordance with validated standard methods described in the Food Chemical Codex, the European Pharmacopeia, the United States Pharmacopoeia and others. Contrary to this approach, there is some need to apply also various rapid high-throughput methods aiming to characterise simultaneously several quality parameters and to reduce efforts for sample preparation to a minimum. In this context new vibrational spectroscopy methods (ATR-IR, NIR and Raman spectroscopy) in combination with various chemometric algorithms are presented which allow efficient monitoring of numerous plant samples within a short time [1]. Especially Raman spectroscopy has been found to be a reliable and non-destructive method for rapid discrimination of different plant species or chemotypes if characteristic key bands can be observed in the spectrum. But also NIR and ATR-IR spectroscopy has made the handling of powdered as well as liquid samples very quick and simple. Today, portable IR and Raman spectrometer systems are available which need only small sample amounts of a few microliters or milligrams for analysis. In most cases, vibrational measurements can be performed directly on plant tissues as well as on fractions isolated from the plant material by hydro-distillation or solvent extraction. Based on individual marker bands, spectroscopic analyses in principle allow the discrimination of different species, and even to classify chemotypes among the same species. Combination of vibrational spectroscopy and hierarchical cluster analysis provides a fast, easy and reliable method for chemotaxonomic characterization. The ability to rapidly monitor various plant components provides the possibility to efficiently select high-quality single plants from wild populations as well as progenies of crossing experiments. Today, vibrational spectroscopy is already introduced in industry in order to perform fast quality checks of incoming raw materials and continuous controlling of production processes. Furthermore, a study is presented which demonstrates the variation of metabolite profiles of onion bulbs (*Allium cepa* L.) depending on genetic and environmental factors. Using a recently established metabolite profiling approach based on liquid chromatography-coupled electrospray ionization quadrupole time-of-flight mass spectrometry [2], polar and semipolar metabolites which belong to different compound classes determining nutritional, sensory, and technological quality of onion bulbs such as saccharides, flavonoids, S-substituted cysteine conjugates, amino acids, and derived  $\gamma$ -glutamyl peptides were relatively quantitated in parallel. Statistical analyses of the obtained data indicated that depending on the compound class genetic and environmental factors differently contributed to variation of metabolite levels. For saccharides and flavonoids the genetic factor was the major source of variation, whereas for cysteine sulfoxides, amino acids, and peptides both genetic and environmental factors had a significant impact on corresponding metabolite levels. The described comprehensive metabolite profiling approach targeting all relevant compound classes has been performed in an exemplary manner and can be applied in a similar way to examine other plant species such as medicinal and aromatic plants with respect to individual aspects of their biological activity.

**Keywords:** Quality control, breeding, Raman, infrared, mass spectrometry

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## New Avenues for Good Old Natural Products (NPs)

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NPs remain a great source of inspiration when developing analytical methods as well as bioactive compounds. We will illustrate this statement by presenting three concrete examples. The rapid and targeted chemical characterization of complex mixtures of secondary plant metabolites has become essential to many areas of NPs research such as dereplication studies, metabolomics profiling, and quality control. In this respect high-performance liquid chromatography coupled with mass spectrometry (HPLC-MSn) is commonly considered as method of first choice, while others such as matrix assisted matrix laser desorption ionization (MALDI) as well as matrix free laser desorption ionization (LDI) are hardly discussed. As an introduction, the present lecture will highlight some recent advances in MALDI and LDI such as the development of highly selective MALDI matrices for the detection of alkaloids as well as the matrix free LDI detection of UV absorbing NPs. Indeed MALDI as well as LDI-MS may provide useful complements or alternatives to classic analytical approaches in NPs' research. Conventional chemical fungicides commonly used to protect crops against fungal infections present the drawback to be highly pollutant for the environment, especially for soil and water supply, whereas these products may be highly toxic for humans. The so-called "Alternaria Leaf Spot" is a common disease of crucifers caused by the fungal pathogen *A. brassicicola* which affects different crops including cabbage, kale, Brussels sprout, cauliflower and broccoli. Indole phytoalexins camalexin and brassinin play in planta a key role in crop protection against this necrotrophic agent. However it has been shown that mutants become phytoalexin-resistant by activating at least three signaling pathways named as Cell Wall Integrity (CWI), High Osmolarity Glycerol (HOG) and Unfolded Protein Response (UPR). The latter is particularly involved in the fungus protection against phytoalexins since UPR deficient avirulent mutants of *A. brassicicola* appear as hypersensitive to camalexin and brassinin. Since very few UPR inhibitors such as the synthetic STF-083010 are known we decided to develop an original screening assay, detecting the production of a HAC1 fluorescence-induced protein, i. e. a transcriptional activator involved in the UPR pathway, in *Saccharomyces cerevisiae* cultures. The preliminary screening of an in-house NPs library [c.a. 70 compounds] revealed four compounds as potential UPR inhibitors. Finally, RT-PCR validated the true inhibitory effect of 2-deprenyl-rheediaxanthone B and griffipavixanthone which clearly appeared as good candidates for inhibiting UPR and, consequently, alternative crop protections. The last example deals with functional lipidomics, i. e. a combination of comprehensive lipid mediator profiling together with mechanistic and cell-biological studies aiming at unravelling the molecular mechanism of bioactive agents. This approach was developed during a fruitful collaborative project, involving different European universities, focusing on the role of vitamin E ( $\alpha/\beta/\gamma/\delta$ -tocopherol/tocotrienol), which inhibits pro-inflammatory leukotriene formation and protects from leukotriene-related diseases (e.g., asthma, cardiovascular disease and cancer) but with controversial clinical evidence. As far as 5-lipoxygenase (5-LO) activity was concerned, it was shown that  $\omega$ -oxidation of vitamin E derivatives leads to a variety of long-chain hydroxy- and -carboxy metabolites which potently inhibited the enzyme. Further structural optimization revealed garcinoic acid ( $\delta$ -tocotrienolic acid, GA) -isolated from *G. kola* seeds- as one of the most potent inhibitors of 5-LO within this series. GA was then used as a scaffold to semisynthesize potent specific 5-LO inhibitors.

## Liquorice Triterpenoids are Good or Bad?

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Liquorice extract from the roots of *Glycyrrhiza glabra* L. (Fabaceae) is one of the herbal medicines that are used widely in various countries. Extracted liquorice, containing glycyrrhizin (GA) and its main component 18 $\beta$ -glycyrrhetic acid (18 $\beta$ -GA) have been used as an additive for flavoring and sweetening of tobacco, candies, and beverages. Licorice has been traditionally prescribed for treating conditions like asthma, dry cough, and other "pectoral diseases". We in our previous studies demonstrated the hepatoprotective and renoprotective effects of liquorice extract. The most reliable route of administration for liquorice extract often is oral method. There are however, little is known about the effects of liquorice compounds on integrity of intestinal tract. Therefore, the current study aimed to highlight any impact of aforementioned compounds in CaCo-2 cells. Two methods of MTT and LDH were used to estimate the cytotoxicity of used compounds. To evaluate the effect of liquorice compounds on paracellular flux, Lucifer yellow (LY) as a membrane-impermeable molecule was used and the permeability of LY was measured after 24 exposure to various concentrations of glycyrrhizin and two metabolites. The fluorescence intensity of LY in the basolateral compartment was measured. Moreover, the integrity of cellular monolayer was assessed by measuring the TEER at 0, 3, 6, 12 and 24 h after exposure to increasing concentrations. The expression of junctional adhesion molecules following exposure to GA and its metabolites for 24 h also was analyzed both at mRNA and protein levels. Only 18 $\beta$ -GA and at the highest given concentration could significantly reduce the cell viability, which was measured with two LDH leakage and MTT metabolic activity determination assays. We found that 18 $\beta$ -GA at 100  $\mu$ M concentration remarkably reduced the TEER values following 3 h exposure and the mentioned values were further declined in a time-dependent manner. The lowest antioxidant capacity and the highest ROS production potency were found in the group of CaCo-2 cells which were exposed to the highest concentration of 18 $\beta$ -GA. Only 100  $\mu$ M of 18 $\beta$ -GA was able to significantly ( $P < 0.05$ ) increase the Lucifer yellow permeability via CaCo-2 cell's tight junctions.

Our data suggest that despite of plenty of medically beneficial effects of liquorice extract, much caution must be taken in account in the oral and frequently usage of GA and in particular its 18 $\beta$ -GA metabolites.

**Keywords:** Liquorice extract; CaCo-2 cells; Transepithelial Electrical Resistance



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## ***Kelussia Odoratissima* Mozaff. (Apiaceae): Insights from Ethnobotany to Phytochemistry and Biological Activity**

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*Kelussia odoratissima* Mozaff. Known as “Kelos” or “Karafse Kouhi” in Iran from the Apiaceae family is an endemic and endangered plant growing in the central Zagros Mountains of Iran at altitudes of 2500 m and above. Kelos is one of the most popular wild culinary herb used in salads, pickles, soups and yogurt by local people, especially in the *Chaharmahal & Bakhtiari* province. It is also well known in Isfahan, Shiraz and Ahvaz as part of the traditional remedies and spice [1]. There are a plethora of biological activities traditionally associated with the pharmacologically of this plant, including treatment for rheumatism, indigestion, hypertension, inflammation, ulcers and cardiovascular diseases [2, 3]. In this study, the ethnobotanical background, extinction risks and regeneration and domestication of the plant and popularity of the *Kelussia* will be explained. The metabolite profiling of *kelussia* different parts has been carried out using GCMS and LCMS (LC-ESI/LTQOrbitrap/MS and LC-PDA-ESI-MS<sup>n</sup>). The major components of this plant are phthalide as mono and dimers. The properties, stability and isolation and identification of some bioactive compounds have some challenges and will be described. Several biological activities, including anti-angiogenesis (in zebrafish and HUVECs), antiepileptic (in zebrafish) and antioxidant properties are studied and will be presented.

**Keywords:** *Kelussia odoratissima*, Metabolite profiling, Zebrafish, Antiangiogenesis, Phthalides

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## **Enhanced Production of Tropane Alkaloids in Hairy Root Cultures of *Hyoscyamus kurdicus* Bornm. Treated with Methyl- $\beta$ -Cyclodextrin and Coronatine**

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One of the best biotechnological methods for plant bioactive compounds production is hairy root cultures. On the other hand, application of biotic or abiotic elicitors in hairy root cultures can enhance the secondary metabolites production [1] so in this research two biotic elicitors, methyl- $\beta$ -cyclodextrin ( $\beta$ -CD) and coronatine (Cor), were used in hairy root cultures of *Hyoscyamus kurdicus* in order to increase the capacity of hyoscyamine (HYO) and scopolamine (SCO) production. In this regard the *Agrobacterium rhizogenes* A4 was used for infection of 2 month pot plant leaves of *H. kurdicus*. One gr fresh weight of selected hairy root line were inoculated in 30 ml of liquid half-strength B5 (B5/2) medium supplemented with 3% sucrose and placed in a shaker incubator (110 rpm) at 25 °C in dark situation. The old medium was replaced with 30 ml fresh medium on day 14th containing the elicitor treatments including: 50 mM  $\beta$ -CD, 0.5  $\mu$ M Cor and joint treatment of 50 mM  $\beta$ -CD and 0.5  $\mu$ M Cor with 3 replications. The sampling was performed on day 21 (T1) and 28 (T2) of culture. According to HPLC analysis the maximum content of HYO in hairy root cultures was observed in control at T1 (1.06 mg/g dw), Cor alone at T1 (0.94 mg/g dw) and combination of  $\beta$ -CD and Cor at T2 (0.92 mg/g DW) treatments respectively with no significant difference between them and also  $\beta$ -CD alone showed negative impact on HYO production. On the other hand, the highest amount of SCO was detected in treated hairy root cultures with Cor alone at T1 (4.57 mg/g dw), combination of  $\beta$ -CD and Cor at T2 (4.06 mg/g dw) and Cor alone at T2 (3.73 mg/g dw) with no significant difference between them. The results indicated  $\beta$ -CD alone didn't have significant effect on SCO production.

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## A Comparative Study on the Effect of Medicinal Drops of Damperly and Placenta in the Treatment of Sinusitis-Double Blind Randomized Clinical Trial.

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Herbal medicinal plants such as black currant, olive and rosemary have been identified as antibacterial agents in different herbal remedies. In this study, we tried to investigate the comparative effect of diphtheria drops and placebo in the treatment of sinusitis in a randomized, double blinded clinical trial. This double-blind clinical trial was conducted in which 50 patients with sinusitis were selected based on the presence of two major symptoms or major and two minor, according to the definition of sinusitis and the table published in this regard and randomly divided into two groups of 25. The control group received placebo (drops of distilled water) and the group received dipped herbal drops. For both control and treatment groups, routine sinusitis, which included Co-Amoxiclav antibiotics (in the case of sepsis sensitivity), washed serum and Fluticasone inhaler. Signs of the patients were evaluated before entering the study and two weeks after the treatment. All statistical analyses were done in SPSS software. There were differences between the groups for the underlying variables. Dairy herbal drops were more effective than placebo in reducing and even eliminating some of the symptoms of sinusitis. In this regard, the droplet of dairy and placebo did not have the same effect and there was a significant difference between them ( $P < 1.000$ ). Dairy herb receptor group was more effective in reducing the symptoms of sinusitis than in the placebo group. Hence, it has a certain superiority.

**Keywords:** Sinusitis, Bronchitis, Treatment, Drip drops, Placebo

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## Analysis of Genes Expression Pattern Involved in Biosynthesis of Secondary Metabolites of *Hypericum perforatum* L. in Response to Ultraviolet Radiation Stress

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Saint John's wort (*Hypericum perforatum* L.) is an important medicinal plant which have been used to cure diseases for long times. It has active biological components such as hypericin, hyperforin and pseudohypericin; these compounds are reported to have antiviral, antidepressant and anticancer activities. However, the content of these compounds in plants is very low. Treating plants with UV lights and especially UV-B is a technique to increase the content of secondary metabolites in medicinal plants. So, to study the possibility of using this technique in Saint John's wort, this experiment was conducted in the greenhouse of Horticulture Department, Shiraz University College of Agriculture, Shiraz, Iran, in 2016 and 2017. The experiment was conducted in factorial in the form of a completely randomized design (CRD) with three replications. In this experiment, plants were treated with UV-B light (20 w/m<sup>2</sup>) for 10, 20, 40 and 80 minutes and then hypericin content was measured in different times after treatment (12, 24, 48 and 96 h after treatment). Results indicated that hypericin content was significantly increased when plants were treated with UV-B light for 10 min, and the best time to harvest plant tissue was 12 h after the treatment. On the other hand, gene networks were drawn for genes affecting the biosynthesis pathway of secondary metabolites in Saint John's wort. Among these genes, *PAL* and *4CL* genes from shikimic acid pathway and *PKS* and *HYP-1* genes from the biosynthesis pathway of hypericin were selected to study the gene expression under UV treatment. Studying the genes with real-time qPCR indicated that gene expression was significantly reduced; showing the effect of UV treatment on DNA molecules destruction.

**Keywords:** Gene network, Hypericin, Ultraviolet radiation, *HYP-1*, *PKS*, *PAL*, *4CL*

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## Antioxidant Potential and Secondary Metabolites of *Ferulago Angulata* (Schlecht) Boiss at Various Habitats

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Chavil (*Ferulago angulata*) is a perennial medicinal plant that belongs to the Apiaceae family. The plant spreads in Turkey, Syria, Lebanon, Iraq, as well as Iran [1]. The long-term use of plant prevents cancer and cardiovascular disease. In addition, the plant oil has high antimicrobial activity at high concentrations and is used as a food preservative, especially for dairy products [2]. Different habitats affect the plant growth as well as secondary metabolites. So this research was conducted to evaluate the essential oil content and composition as well as phenolic compounds and antioxidant activity of Chavil in different habitats from five locations in east of Khuzestan province; North Mongar altitude 2000 (M 2000 N), M 2500 N, South Mongar altitude 2500 (M 2500 S), M 3000, North Mlhe Amir altitude 2300 (MA 2300 N), MA 2600 N, North Kohsyah altitude 1800 (KS 1800 N), South Tagak altitude 2600 (T 2600 S) and North Gandomkar altitude 2600 (G 2600 N). Sampling was carried out on June and plant was dried on shade and ambient temperature. Essential oil was extracted by Clevenger apparatus and then analyzed by GC and GC-MS. Extraction was done by ultrasonic and the antioxidant activity was evaluated through DPPH and ORAC methods by plate reader. The phenolic compounds were measured by spectrometer. The results showed that secondary metabolites of plant change significantly at various habitats. The highest (1.34%) and the lowest (0.18%) essential oil contents were obtained in M 2500 S and MA 2600 N habitats, respectively. There were noticeable differences in the amounts of several compounds amid nine habitats. The main oil components were alpha pinene (20.84-49.06%), beta-E-ocimene (5.95-25.70%), transverbenol (3.01-6.97%) and Bornyl acetate (5.15-20.63%). Interestingly, G 2600 N had different oil profile and compounds such as linalool, transverbenol, bicyclogermacrene and gamma cadinene were higher than the rest of populations. The highest and the lowest flavonoid content were registered at M 2000 N and MA 2600 N region, respectively. In contrast, M 2500 S and M 2000 N had the highest and lowest total phenol, respectively. In both DPPH and ORAC methods, the maximum and minimum antioxidant activity was obtained in M 2500 N and T 2600 S habitats, respectively. In summary, results suggest that the quality and quantity of chemical compounds and their antioxidant activity vary depending on the locations which refer to both genetic and environmental situations.

**Keywords:** Chavil; Habitat;  $\alpha$ -pinene;  $\beta$ -E-ocimene; Bornyl acetate; Antioxidant activity; Flavonoid

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## Study of Variability in Saffron with more than Three Stigmas Using Molecular Markers

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Saffron is the most valuable spice in the world. It is genetically a monomorphic clone. However, differences in phenotype and quality have been reported. The most important agro-economically phenotypic variation is the appearance of flowers with more than three stigmas. The main objective of this study was to study the genetic variability of saffron clones with more than 3 stigmas using SSR and ISSR molecular markers. In this research, saffron clones with more than three stigmas were collected along with the corm and the root from Saffron fields of Qaen and Sarayan, South Khorassan province, then transferred as a whole to the Biotechnology Laboratory of the Faculty of Agriculture, University of Birjand. The number of stigmas in each flower was counted. Genomic DNA was extracted according to CTAB method with minor modifications from leaves of the flower with more than three stigmas. Flower with more than three stigmas was larger and had more petals than ordinary ones. The most frequent number of flowers with more than three stigmas was related to four and five stigmas with 38%. Six-spice samples with a frequency of 14% were observed. Among the collected samples, only one specimen with seven stigmas was observed. Of the 48 tested ISSR primers on the bulk of DNA, only 16 primers amplified bands and selected. The results of agarose gel electrophoresis for ISSR primers amplified the bands ranged from 100 to 1000 bp. By examining the bands formed for ISSR primers, no significant polymorphism was observed between different clones of saffron. Therefore, based on this marker system, no sign of genetic diversity was observed between clones with different number of stigmas. Among the tested SSR markers, 10 primer pairs showed amplified band among the clones. The results of correlation analysis based on Spearman correlation coefficient showed that there was no statistically significant correlation between microsatellite marker alleles and number of stigmas.

**Keywords:** Epigenetics, Genetic diversity, SSRs

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**The molecular det of Dendrosomal Curcumin (DNC) as a Therapeutic Agent for Modulating the Expression of p53 in both Wild Type and Mutant Type Cancer Cells**

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The aim of this paper is to investigate the effect of dendrosomal curcumin (DNC) on the expression of p53 in both p53 mutant cell lines SKBR3/SW480 and p53 wild-type MCF7/HCT116 in both RNA and protein levels. Curcumin, derived from *Curcumin longa*, is recently considered in cancer related researches for its cell growth inhibition properties. p53 is a common tumor-suppressor gene involved in cancers and its mutation not only inhibits tumor suppressor activity also promotes oncogenic activity. Here, p53 mutant/Wild-type cells were employed to study the toxicity of DNC using MTT assay, flow cytometry and Annexin-V. Real-time PCR and Western blot were used to analyze p53, BAX, Bcl-2, p21 and Noxa changes after treatment. DNC during the time increased the SubG1 cells and decreased G1, S and G2/M cells, early apoptosis also indicated the inhibition of cell growth in early phase. Real-Time PCR technique showed an increased mRNA of BAX, Noxa and p21 during the time with decreased Bcl-2. The expression of p53 mutant decreased in SKBR3/SW480, and the expression of p53 wild-type increased in MCF7/HCT116. Consequently, p53 plays an important role in mediating the survival by DNC, which can prevent tumor cell growth by modulating the expression of genes involved in apoptosis and proliferation.

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**6(17)-Epoxylythyrane Diterpenes from *Euphorbia sogdiana* Popov with Cytotoxic Activity**

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*Euphorbiasogdiana* is a rare species known since Roman times and more recently as component of the Iranian flora in the Kopetdagh region in Northeast of Iran. Diterpenoids with wide range of their potentially valuable biological activities and their broad structural diversity are interest for new drug discovery. Lathyrane are a class of diterpenoid metabolites and their structure is based on a five-membered ring condensed with an 11 membered ring. In this study we performed isolation and structure elucidation of diterpenoids from *Euphorbia sogdiana* and it was resulted isolation and identification of three new and a known 6(17)-Epoxylythyrane diterpenes. Air-dried plant materials were powdered and exhaustively extracted with acetone-dichloromethane (2:1). The extracts were subjected to solvent-solvent partitioning between H<sub>2</sub>O and EtOAc. Non-polar fractions were adsorbed onto RP-18 chromatographed by MPLC. Diterpene-containing extract which eluted with MeOH-H<sub>2</sub>O (7:3) chromatographed by MPLC on a silica gel using a linear gradient solvent system from n-hexane 100% to EtOAc 100%. TLC and <sup>1</sup>HNMR analysis indicated that some fractions contained a series of diterpenoids, which were purified by further chromatographic procedures (preparative and analytical HPLC and PTLC). <sup>1</sup>HNMR, <sup>13</sup>CNMR, 2D NMR, ESIMS, HRMS and IR techniques were used to elucidate of isolated compounds. Cytotoxicity assay of *E. sogdiana* Lathyrane diterpenes were evaluated on Jurkat T-leukemia and EJ-138 bladder cancer cells. Phytochemical analysis of *Euphorbia sogdiana* Popov, Euphorbiaceae, afforded the isolation of three new diterpenes based on the rare 6(17)-epoxylythyrane skeleton, along with a lathyrane previously isolated from *Euphorbia aellenii*. Their chemical structures were established through a combination of nuclear magnetic resonance spectroscopy and mass spectrometric methods. The epoxylythyrane were tested to evaluate their cytotoxic activity against Jurkat T-leukemia and EJ-138 bladder cancer cells and their chemical analogy allowed to propose some structure activity relationships.

**Keywords:** *Euphorbia sogdiana* Popov, Lathyrane diterpenes, 6(17)-Epoxylythyrane

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## Herbosome; Potential Active for Herbal Constituents

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The term “Herbo” means plant while “some” means cell like. Herbosomes technology is one of such systems that incorporate phospholipids into standardized active ingredients of herbal extracts. Most of the biologically active constituents of plants are polar or water soluble molecules. However, water soluble phytoconstituents are poorly absorbed either due to their large molecular size; which cannot absorb by passive diffusion or due to their poor lipid solubility, severely limiting their ability to pass across the lipid rich biological membrane resulting poor bioavailability when taken by mouth. The effectiveness of any herbal medication is dependent on the delivery of effective level of the therapeutically active compounds. Herbosomes absorption in GIT is greater resulting in increased plasma level than individual component. Herbosomes novel complexes which are prepared by reacting from 3-2 moles but preferably with one mole of natural or synthetic phospholipids like phosphatidyl choline, phosphatidyl ethonolamine or phosphatidylserine with one mole of component like flavolignans, either alone or in the natural mixture in aprotic solvent such as dioxane or acetone. The herbosome complex can be then isolated by precipitation with non-solvent such as aliphatic hydrocarbons or lyophilisation or by spray drying. In the complex formation of herbosomes the ratio between these two moieties is in the range from 0.5-2.0 moles. The most preferable ratio of phospholipids to flavonoids is 1:1. Herbosomes results from the reaction of stoichiometric amount of phospholipid with standardized herbal extract or polyphenolic constituents like (flavonoids, terpenoids, tannins, xanthenes, etc) in nonpolar solvents. Herbosomes improve the *in vivo* bioavailability of herbal drugs. Herbosomes have also improved pharmacokinetic and pharmacological parameters which advantageously be used in treatment of various disease as the more amount of active constituent becomes available at site of action at similar or less dose as compared to the conventional herbal extracts.

**Keywords:** Herbosome, Phospholipids, Flavonoids, Polyphenols, Herbal extract

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## Novel Technologies in Extraction of Active Pharmaceutical Ingredients from Medicinal Plants

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Extraction is the separation of medicinally active portions of plant using selective solvents through standard procedures. The purpose of all extraction is to separate the soluble plant metabolites, leaving behind the insoluble cellular marc (residue). Several of the commonly used extraction methods are Traditional methods such as maceration and Soxhlet extraction are commonly used at the small research setting or at Small Manufacturing Enterprise (SME) level. Significance advances have been made in the processing of medicinal plants such as the modern extraction methods; microwave-assisted (MAE), ultrasound-assisted extraction (UAE) and supercritical fluid extraction (SFE), in which these advances are aimed to increase yield at lower cost. Other methods such as accelerated solvent extraction (ASE) and supercritical fluid extraction (SFE) are also being used in the extraction of plant materials.

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## Comparison between essential oil of Lavender from Iran and Delberg Germany

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Lavender (*Lavandula anagustifolia*) is plant that flowering season of lasts from first to end August. Lavender oil has benefits such as reduce anxiety and emotional stress, improve brain function, relieve pain, and improve sleep. This study describes the chemical composition by using gas chromatography of two essential oil of lavender from Iran and Delberg Germany. Compounds such as limonene, 1,8 cineol, linalool,  $\alpha$ -terpineol, borneol and camphor in aerial part of essential oil of Iranian lavender essential oil were 2.64, 21.74, 31.7, 1.36, 10.15 and 6.13 w/w%, respectively. while the amount of limonene, 1,8 cineol, linalool,  $\alpha$ -terpineol, borneol and camphor in essential oil of Delberg Germany were 12.3, 35.8, 9.4, 0.3, 0.2 and 33.7 w/w%, respectively.

**Keywords:** Lavender, Essential oil, Chemical composition, Gas chromatography

**References:** [1]H.; MA, J.; M. Wilkinson. Lavender essential oil: a review. **2005**, 10(1), 35-37.

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## Effect of Inoculation of *Mycorrhizal arbuscular* Fungi on Survival and Morphological Traits of *Myrtus communis* L. under Drought Stress.

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The medicinal plant of *Myrtus communis* L. that distributed in arid and semi-arid regions of the country, due to contain many medicinal active compounds such as essential oil, tannin, phenol and flavonoids, its have many drug uses. The purpose of this study was to investigate the mycorrhizal fungus inoculation on the improvement of growth characters under drought stress in controlled conditions of greenhouse. The experiment was carried out in a factorial of  $4 \times 3$  in a completely randomized design with 3 replicates (each replicate had 4 seedlings). The treatments applied in this experiment consist of water deficit stress in 3 levels of control (100% FC (field capacity)), moderate (60% FC) and severe (30% FC) and inoculation in 7 levels (control (no inoculation), inoculation with mycorrhizals of *Glomus mosseae*, *G. intraradices*, combination of *G. mosseae* + *G. intraradices*, inoculation with rhizobacterias of *Pseudomonas fluorescens*, *P. putida* combination of *P. fluorescens* + *P. putida*) that conducted in a 6 months period. The results of Two Way ANOVA showed that the interaction of drought stress and inoculation of mycorrhizal fungus at 1% and 5% level on growth and morphological traits such as survival, leaf area, root length, root volume, root biomass and total biomass of the seedlings were significant but did not significant effect on leaf and stem biomass. So that with increasing levels of drought stress all of the seedlings characters showed a decreasing trend, but inoculation with mycorrhizal fungi led to improve the performance of plant under drought stress, so that in all traits, treatment of drought stress 100% FC and combination of two types of mycorrhizal fungi was the highest and the treatment of 30% FC and non-inoculated showed the lowest. The results of the study also showed that the effects of drought stress and inoculation of mycorrhizal fungus alone had a significant effect on all morphological traits of seedlings. Overall, the results of this experiment indicated that the symbiosis with Arbuscular mycorrhizal fungi can led to increase the morphological traits under drought stress conditions and also improve resistance to drought stress of seedling. Effect of both species of *G. intraradices* and *G. mosseae* was almost identical.

**Keywords:** *Myrtus communis*, Mycorrhizal symbiosis, Drought stress, Leaf area, Total biomass

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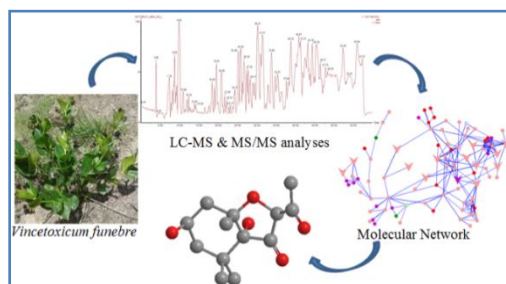
## A Molecular Networking Technique for Dereplication of Ache Inhibitory Compounds from the Medicinal Plant *Vincetoxicum Funebre*

**Mahdi Abbas-Mohammadi<sup>1,2</sup>, Mahdi Moridi Farimani<sup>1\*</sup>, Peyman Salehi<sup>1</sup>, Samad Nejad Ebrahimi<sup>1</sup>, Ali Sonboli<sup>1</sup>, Celine Kelso<sup>2</sup>, Danielle Skropeta<sup>2</sup>**

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In drug discovery of natural products, reliable and fast tentative identification of known metabolites is mandatory for exploration of new bioactive natural compounds. Actually, computational tools constitute great alternatives in order to find hit compounds saving time and cost. Herein, a molecular networking technique using UHPLC-QTOF-MS and MS/MS was performed to rapidly dereplicate the chemical composition of the ethyl acetate extract of the medicinal plant *Vincetoxicum funebre*, as an active extract against the acetylcholinesterase enzyme. In addition, the inhibitory activity of the identified compounds was evaluated against the acetylcholinesterase enzyme via molecular docking analysis. Molecular networking analysis led to the dereplication of fifty compounds, of which a glycosylated flavonoid indicated the highest affinity to the enzyme with a docking score value of -13.43 kJ/mol. Semi-preparative HPLC analysis based on profiling of *V. funebre* also allowed the isolation of one new compound as well as four known compounds.



**Keywords:** Molecular networking, LC-MS, Molecular docking, Acetylcholinesterase inhibition

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## Market study of Migraine Cut<sup>®</sup> (Nasal Spray).

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Migraine headache is a prevalent, temporary, and crippling disease. More than 11 percent of the world population which amounts 800 million are affected by migraine. Based on a report of WHO, migraine is one of the 30 disabling diseases in the world, which results in clinical care of the patients. The burden of social and economic costs of migraine rests on both patients and society [1]. The costs include “direct costs” (like cost of doctor, cost of drug, and clinical costs) and indirect costs (such as cost of absenteeism and cost of decrease in productivity). For instance, the annual economic cost of migraine in the USA exceeds 21 billion dollars and in Europe amounts 18.5 billion euros. For the last 21 years the collaboration of the researchers of three medical science universities and two research centers, and one multi-professional pain clinic resulted in a new curative herbal-based medicine for migraine headaches. The final product is MigraineCut<sup>®</sup>, a nasal spray. An extensive pre-clinical R&D and clinical trials based on IHS documents and US FDA directives were completed. The curative and herbal-based nature of MigraineCut<sup>®</sup> is unique in the world. The final results of MigraineCut<sup>®</sup> efficacy on more than 1100 patients indicates 81 percent cure and 88.5 satisfactions of migraine patients. This effort is possessed by MIM Daroo Company, established by the initiators of the project. A preliminary prudent market study indicates that the ROI of MigraineCut<sup>®</sup> sales is very attractive and also the investment in the production of such herbal products causes to remarkable national saving.

**Keywords:** Migraine, MigraineCut<sup>®</sup>, market, ROI.

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## Resveratrol Treatment Improve Renal Function in Pyelonephritic Rats

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Urinary tract infections is a common causes of outpatient referrals to medical centers. Acute pyelonephritis is often treated by injectable antibiotics. Side effects, especially resistance to antibiotics, considered use of non-antibiotic compounds. Resveratrol which is found in grapes and its products is a powerful antioxidant, anti-inflammatory and anti-bacterial as well. In this study, the effect of resveratrol on renal function in pyelonephritis rats was evaluated. Pyelonephritis induced by direct injection of ATCC25922 strain of E. Coli by surgical expose of right kidney in 20 male Wistar rats. Induced urinary tract infection confirmed by urine culture and 72 hours after induction of pyelonephritis, rats treated with resveratrol (10 mg / kg) and ceftriaxone via intraperitoneal injection for a week. After 6 weeks plasma markers of renal function such as urea, creatinine and cystatin C determined by Hitachi biochemistry autoanalyser. Urea, creatinine and cystatin C significantly increased in pyelonephritis which show renal function is impaired (p <0.001). Resveratrol treatment almost neutralize the effects of pyelonephritis and the plasma markers effectively reduced compared with the control group. Resveratrol and Ceftriaxone combination therapy probably via synergistic effects, more effectively improved renal function. (P <0.05). Totally our finding demonstrated that resveratrol improved renal function of pyelonephritis rats. This study provides evidence that resveratrol suggest a protective role almost equal with the ceftriaxone against kidney damage induced by pyelonephritis.

**Keywords:** Pyelonephritis, resveratrol and renal function



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## Domestication and Cultivation Practices of Liquirice (*Glycyrrhizaglabra*L.) in Iran

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Liquirice (*Glycyrrhizaglabra* L.) is a valuable medicinal plant which its roots are widely used in different industries like pharmaceutical, food, cosmetic and cigarette industries. Raw materials of this plant are still collected from wild habitats and the growing market and use by industries cause to threatened the wild populations in different countries. Domestication and cultivation of this species is the only way to support industries and decrease the pressure on wild habitats. The aim of this research was to study the ability of domestication this plant in low input agricultural systems. Three different experiments are conducted in two years of 2016 and 2017 to study the effect of irrigation regimes, plant density and organic fertilizers on growth, yield and phytochemical properties of different wild populations of Eqlid, Ramjerd, Baft and Lalehzar. Results showed that yield parameters decreased by increasing of water evaporation. The highest ground yield per plant and per square meter, 512.92 g and 2052 g.m<sup>-2</sup> in the second year of study were observed in 100 mm evaporation but it was not a significant difference with 200 mm evaporation. So it seems that after plant establishment in second year increasing of irrigation times did not increase ground yield significantly. Results showed that with decreasing of irrigations from 100 mm evaporation to no irrigation the ground yield decreased nearly 50 % but still at no irrigation this plant show a valuable amount of 861.5 g.m<sup>-2</sup> in second year. Our observations indicated that the Baft population in first year grew very slowly but in the second year and after establishment grew very fast and the highest ground yield was observed in this population but the amount of glycyrrhizic acid and glabridin was significantly higher than other populations. The highest ground yield was obtained in a plant density of 16.66 pl.m<sup>-2</sup> and the growing and yield parameters did not react to different organic fertilizers which shows that this plant can be used for domestication in low input agricultural systems.

Keywords: medicinal plant, glabridin, cultivation, water deficiency, plant density

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Armanini, D., et al.. *Journal of Experimental and Clinical Endocrinology and Diabetes*. **2002**, *110*, 257–261.

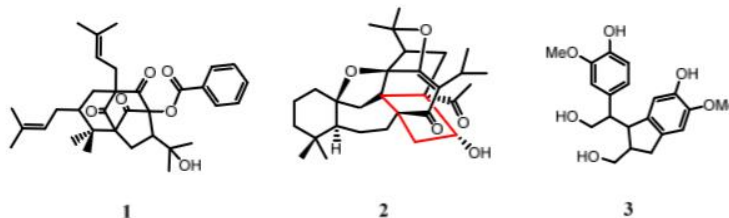
## Iranian Medicinal Plants as Sources of New Bioactive Compounds with Unprecedented Architectures

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Natural products research continues to explore a variety of lead structures, which may be used as templates for the development of new drugs by the pharmaceutical industry. These substances, representative of very wide chemical diversity, continue to demonstrate the importance of compounds from natural sources in modern drug discovery efforts. Nowadays, one of the strategies for drug discovery is extraction and identification of chemical constituents of the plants and assessment of their bioactivities through cellular or animal studies. Our recent studies, aimed at identifying structurally interesting and bioactive metabolites from Iranian endemic species, resulted in the isolation of several new compounds; some of them possess unusual and unique structures (1-3). The structures were elucidated by a combination of 1D and 2D NMR, HRESIMS, and X-ray crystallographic analyses. Plausible biosynthetic pathways toward these new skeletons were proposed. Biological properties of the new compounds were also investigated. Some of these compounds showed good in vitro antiplasmodial and anticancer activities at submicromolar concentrations.



Keywords: 2D NMR, Structure elucidation, Biosynthetic pathway, Biological activity

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## Medicinal Herbs in Cosmeceuticals: a Review

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The market research shows an incredible growth in trade of cosmeceuticals and also in popularity among consumers as a loss of faith in chemical and synthetic skin remedies. Medicinal plant extracts are believed to induce better results by delivering nutrients and less side effects. So herbal cosmetic industry plays a major role in fulfilling this worldwide demand for natural products [1]. Many phytochemicals have been evaluated for their cosmetic-therapeutic potential. For example, clinically proven ingredients such as antioxidants, anti-inflammatory agents and depigmentation factors which are widely used in cosmetic formulations, are claimed to address a variety of skin conditions in beauty lines; the application of natural essential oil in aromatherapy has opened a new market in fragrance industry and pharmaceutical-style benefits of herbal extract is expanding into other beauty categories, such as haircare and nail care products and etc. too [2]. In addition new herbal skin care treatments are emerging, presenting dermatologists and their patients the challenge of understanding the science behind these cosmeceuticals. Therefore the need for cosmeceuticals research, regulation and clinical trial is more than ever necessary. This speech is going to highlight the broad applications of botanical extracts and essential oils in the current marketplace, and to expose some of brand new standardized extracts produced in Zardband Pharmaceuticals for beauty and personal care industry. Hopefully, more questions will be raised than answered and some ideas for intellectual discourse will be provided to fulfil this gap in near future.

**Keywords:** Medicinal plants; Cosmeceuticals; Aromatherapy; Herbal extract; Phytochemicals.

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### Evaluation of Peppermint (*Mentha piperita* L.) and Rosemary (*Rosmarinus Officinalis*) as Antibiotic Growth Promoter Substitutions on Immunological Responses of Japanese Quails (*Coturnix japonica*)

**Seved Hadi Goldani,<sup>1\*</sup> Mohsen Daneshyar,<sup>1</sup> Keyvan Azizi,<sup>1</sup> Mehرداد jalalifard,<sup>1</sup> Seyed Meysam Abtahi<sup>2</sup>**

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Botanical products, also known as phytogenic feed additives (PFA's), are a relatively new class of feed additives that use as antibiotic growth promoter substitutions in poultry nutrition and our knowledge is still rather limited regarding their modes of action and aspects of their application. This research was conducted in two separate experiments to evaluate the effects of different levels of Peppermint (*Mentha piperita* L.) powder and Rosemary (*Rosmarinus Officinalis*) powder on immune system responses of Japanese quails (*Coturnix japonica*). For each experiment, 200 one-day-old quail chicks, were used in 4 treatments and 5 replicates each (10 birds per replication). The experimental treatments consisted of four levels of Peppermint and Rosemary 0.0, 0.25, 0.5 and 0.75 percent. Results showed that, the consumption of 0.5 and 0.75% peppermint powder significantly reduced the severity of respiratory burst ( $P < 0.01$ ). No effects of experimental treatments were observed for heterophil, lymphocyte, heterophil to lymphocyte ratio and monocyte counts ( $P > 0.05$ ). Different levels of peppermint powder caused to decreased antibody production against sheep red blood cells (SRBC) and humoral immune suppression ( $P < 0.01$ ). In addition, different levels of peppermint powder enhanced the cellular immune system through increased lymphocyte proliferation and significant increase in the thickness of the membrane between the toes in response to SRBC injection ( $P < 0.01$ ). All the rosemary levels increased the cellular immune response whereas 0.75% rosemary decreased the humoral immune response ( $P < 0.05$ ). The respiratory burst decreased by increasing the rosemary consumption level whereas the lymphocyte proliferation increased by 0.75% rosemary level ( $P > 0.05$ ). In this study, the consumption of the highest rosemary level (0.75%) to 35 days causes the decreased humoral response and increased cellular response in Japanese quail.

**Keywords:** Japanese quail; Rosemary; Immune system; Peppermint; Phytogenic



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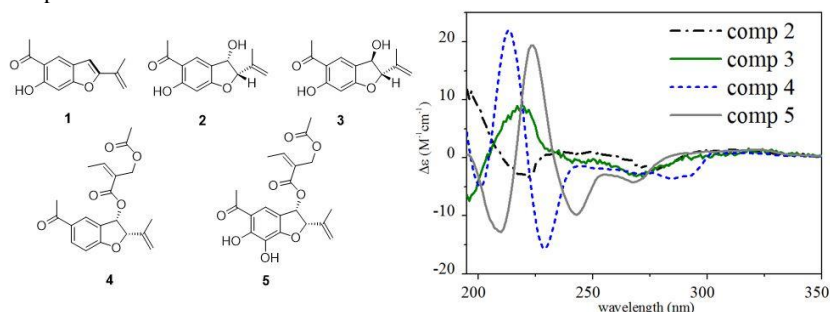
## Stereochemical Study of Benzofurans from *Petasites Hybridus* Rhizomes

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*Petasites hybridus*, the butterbur is species belongs to the Asteraceae family is widely vegetated in Europe, Northwest Asia and North America [1]. It has been reported that this plant are treatment of headache, spasm of gastrointestinal, disturbances of the respiratory tract like bronchial asthma and many other illnesses [2]. Phytochemical investigation of hexane extract of the rhizome of *Petasites hybridus* has been carried out using normal phase column chromatography and RP-HPLC. Five benzofurans isolated, purified and identified. The complete structures elucidated by application extensive 1D, 2D NMR and HRMS spectroscopy. Phytochemical investigation of n-hexane extract of the rhizome of *P. hybridus* collected from north part of Iran has been carried out using normal phase column chromatography and RP-HPLC. Three known (1-3) together with two new (4-5) sesquiterpenoids have been isolated, purified and identified. The complete structures elucidated by application extensive 1D, 2D NMR and HRMS spectroscopy. Also the absolute configuration of 2-5 were achieved by comparison of experimental ECD spectra with simulated ECD data for possible stereoisomers, by using time dependent density function theory (TDDFT). The results showed that wild growing plant in Iran are new chemo type and these class of compounds are not reported from *P. hybridus* growing in Europe.



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# **Poster Presentation**

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# 7<sup>th</sup> National Congress on Medicinal Plants 12-14<sup>th</sup> May 2018 Shiraz, Iran



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## Essential Oil Composition, Phenolic and Total Phenolic Contents and Antioxidant Activity from Aerial Parts and Oleo-Gum-Resin of *Ferula Assa foetida* L.

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The present work was identified the chemical compounds of essential oil (EO), evaluated the antioxidative activities, phenolic and total phenolic contents (TPCs) from aerial parts of *Ferula assa-foetida* and its oleo-gum-resin. The EO components were analyzed by gas chromatography (GC-FID) and gas chromatography/mass spectrometry (GC/MS). Polyphenolic compounds of methanolic extract of its plant and its oleo-gum-resin were examined by using HPLC analysis. The TPC was assessed by Folin-Ciocalteu method. Furthermore, radical scavenging activity of sample was assessed using Diphenylpicrylhydrazyl (DPPH). Essential oil's analyses showed that 10-epi- $\gamma$ -eudesmol (18.3%),  $\alpha$ -eudesmol (10.9%), agarospirol (7.1%),  $\beta$ -eudesmol (6.6%) and guaialol (5.8%) were the main components from *F. assa-foetida* aerial parts and  $\alpha$ -pinene (22.6%), (Z)-1-propenyl sec-butyl disulfide (20.4%),  $\beta$ -pinene (12.1%), (E)-1-propenyl sec-butyl disulfide (6.6%) and bicyclogermacrene (4.1%) were the main components from its oleo-gum-resin. Chlorogenic acid (2.6 mg/g), ellagic acid (1.3 mg/g), quercetin (0.18 mg/g) and vanillin (0.05 mg/g) were the main polyphenols detected in extract of plant. Also in its oleo-gum-resin were carvacrol (3.6 mg/g), trans-ferulic acid (2.01 mg/g), eugenol (1.4 mg/g), hesperetin (0.73 mg/g), hesperidin (0.66 mg/g) and vanillin (0.22 mg/g), respectively. The TPC from *F. assa-foetida* aerial part was  $50.50 \pm 0.74$  mg/g and from oleo-gum-resin was  $76.12 \pm 6.52$  mg/g. The result showed  $IC_{50}$  of  $1463.99 \pm 70.68 \mu\text{g ml}^{-1}$  in 517 nm from *F. assa-foetida* aerial part and  $IC_{50}$  of  $1417.23 \pm 20.50 \mu\text{g ml}^{-1}$  from oleo-gum-resin. Results implied that *F. assa-foetida* and its oleo-gum-resin are valuable sources of natural compounds with important biological properties.

**Keywords:** *Ferula assa-foetida*, EO, Total phenol, Polyphenol, Antioxidant activity

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## Investigation of Chemical Composition of Essential oils, Phenolic and Total Phenolic Contents and Antioxidant Activity from Aerial Parts and Oleo-gum-resin of *Ferula gummosa* Boiss.

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The present work was identified the chemical compounds of essential oil (EO), evaluated the antioxidative activities, phenolic and total phenolic contents (TPCs) from aerial parts of *Ferula gummosa* and its oleo-gum-resin. The EO components were analyzed by gas chromatography (GC-FID) and gas chromatography/mass spectrometry (GC/MS). Polyphenolic compounds of methanolic extract of its plant and its oleo-gum-resin were examined by using HPLC analysis. The TPC was assessed by Folin-Ciocalteu method. Furthermore, radical scavenging activity of sample was assessed using Diphenylpicrylhydrazyl (DPPH). Essential oil's analyses showed that  $\alpha$ -pinene (18.8%), Bulnesol (14.6%) and Humulene epoxide II (9.6%) were the main components from *F. gummosa* aerial parts and  $\beta$ -pinene (34.2%), Bulnesol (5.5%) and Limonene (4.9%) were the main components from its oleo-gum-resin. Catechin (3.38 mg/g), chlorogenic acid (0.70 mg/g), rosmarinic acid (0.20 mg/g), trans-ferulic acid (0.17 mg/g) and quercetin (0.16 mg/g) were the main polyphenols detected in extract of plant. Also in its oleo-gum-resin were eugenol (0.44 mg/g), trans-ferulic acid (0.07 mg/g), p-Coumaric (0.02 mg/g) and quercetin (0.02 mg/g), respectively. The TPC from *F. gummosa* aerial part was  $5.08 \pm 0.11$  mg/g and from oleo-gum-resin was  $4.10 \pm 0.03$  mg/g. The result showed  $IC_{50}$  of  $4008.24 \pm 89.56 \mu\text{g ml}^{-1}$  in 517 nm from *F. gummosa* aerial part and  $IC_{50}$  of  $5698.75 \pm 278.93 \mu\text{g ml}^{-1}$  from oleo-gum-resin. Results implied that *F. gummosa* and its oleo-gum-resin are valuable sources of natural compounds with important biological properties [1,2].

**Keywords:** *Ferula gummosa*, EO, Total phenol, Polyphenol

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## Composition of the Essential Oils, Total phenolic Contents and Antioxidant Activity of Aerial Parts and Oleo-gum-resin of *Ferula persica* Willd.

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The present work was identified the chemical compounds of essential oil (EO), evaluated the antioxidative activities, phenolic and total phenolic contents (TPCs) from aerial parts of *Ferula persica* and its oleo-gum-resin. The EO components were analyzed by gas chromatography (GC-FID) and gas chromatography/mass spectrometry (GC/MS). Polyphenolic compounds of metanolic extract of its plant and its oleo-gum-resin were examined by using HPLC analysis. The TPC was assessed by Folin-Ciocalteu method. Furthermore, radical scavenging activity of sample was assessed using Diphenylpicrylhydrazyl (DPPH). Essential oil's analyses showed that  $\alpha$ -pinene (18.4%), Myrcene (16.3%) and  $\alpha$ -Bisabolol (8.8%) were the main components from *F. persica* aerial parts and  $\alpha$ -pinene (24.4%), (Z)-1-propenyl sec-butyl disulfide (18.3%) and  $\beta$ -pinene (12.5%) were the main components from its oleo-gum-resin. Chloregenic acid (2.91 mg/g), catechin (0.89 mg/g), hesperetin (0.51 mg/g) and p-Coumaric acid (0.05 mg/g) were the main polyphenols detected in extract of plant. Also, trans-ferulic acid (1.54 mg/g) was in its oleo-gum-resin. The TPC from *F. persica* aerial part was  $70.21 \pm 0.32$  mg/g and from oleo-gum-resin was  $46.85 \pm 1.51$  mg/g. The result showed  $IC_{50}$  of  $1209.89 \pm 20.97 \mu\text{g ml}^{-1}$  in 517 nm from *F. persica* aerial part and  $IC_{50}$  of  $1840.23 \pm 94.34 \mu\text{g ml}^{-1}$  from oleo-gum-resin. Results implied that *F. persica* and its oleo-gum-resin are valuable sources of natural compounds with important biological properties [1].

**Keywords:** *Ferula persica*, EO, Total phenol, Polyphenol, Antioxidant activity

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[1] Hadavand Mirzaei, H.; Hasanloo, T. *Res. J. Pharmacog.* **2014**, *1*, 51-54.

[2] Ahmadvand, H.; Amiri, H.; Elmi, Z.D.; Bagheri, S. *Iranian. J. Pharmacol. Ther.* **2013**, *12*, 52-57.

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## Phenolic and Total Phenolic Contents, Antioxidant Activity and Essential Oil Composition from Aerial Parts and Oleo-gum-resin of *Dorema ammoniacum* D. Don.

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The experiment was carried out using the shadow-dried aerial parts of *Dorema ammoniacum* D. Don. and its oleo-gum-resin in order to investigate the polyphenolic compositions, total phenolic contents (TPCs), antioxidant activity and essential oil (EO) analysis. Polyphenolic compounds of metanolic extract of its plant and its oleo-gum-resin were examined by using HPLC analysis. The TPC was assessed by Folin-Ciocalteu method. Furthermore, radical scavenging activity of sample was assessed using Diphenylpicrylhydrazyl (DPPH). The EO components were analyzed by gas chromatography (GC-FID) and gas chromatography/mass spectrometry (GC/MS). Chloregenic acid (2.1 mg/g), ellagic acid (1.2 mg/g), hesperedin (0.54 mg/g), eugenol (0.53 mg/g), hesperetin (0.40 mg/g), catechin (0.35 mg/g) and vanillin (0.20 mg/g) were the main polyphenols detected in extract of plant, respectively. Also in its oleo-gum-resin were rutin (1.02 mg/g), catechin (0.93 mg/g), carvacrol (0.58 mg/g), hesperedin (0.30 mg/g) and vanillin ( $\sim 0.10$  mg/g), respectively. The TPC from *D. ammoniacum* aerial part was  $79.64 \pm 3.25$  mg/g and from oleo-gum-resin was  $71.28 \pm 0.43$  mg/g. The result showed  $IC_{50}$  of  $659.28 \pm 41.87 \mu\text{g ml}^{-1}$  in 517 nm from *D. ammoniacum* aerial part and  $IC_{50}$   $1356.47 \pm 21.03 \mu\text{g ml}^{-1}$  from oleo-gum-resin. Essential oil's analyses showed that tetradecanal (13.5%), geranyl acetone (9.6%), n-hexadecanal (8.5%), n-heptadecane (8.1%), (*E*)-dihydro-apofarnesol (7.5%) and (*E*)-nerolidol (6.7%) were the main components from *D. ammoniacum* aerial parts and  $\alpha$ -cadinene (10.2%), tetradecanal (7.3%),  $\beta$ -bisabolene (6.6%), n-heptadecane (5.3%) and cis-thujopsene (5.1%) were the main components from its oleo-gum-resin. Results implied that *D. ammoniacum* and its oleo-gum-resin are valuable sources of natural compounds with important biological properties [1].

**Keywords:** *Dorema ammoniacum*, Polyphenol, Total phenol, Antioxidant activity, Essential oil

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## Introduction of Plant Cover and Floristic Composition of Medicinal Plants in the Hyrgan Mountainous Area Chaharmahal Va Bakhtiari Province, Iran

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Iran's Flora due to specific geographic conditions and having different weather climates as a rich source of the plant species has been identified all over the universe [1]. Meanwhile, there are numerous habitats of medicinal plants in Iran so that their desirable capabilities in terms of production of various essential oils coupled with their countless therapeutic effects have been confirmed clearly [2]. Chaharmahal va Bakhtiari province due to various related factors such as rich biodiversity, variable altitude classes along with shaping up of the numerous microclimates as one of the major floristic hotspots has substantial placement in Central Zagros of Iran. The Hyrgan mountainous area has been located in the Baba Heydar town between the two great mountains and also it is situated in the central part of Farsan county in the mentioned province. This area has a relatively good vegetative potential and it is mainly refers to strong genetic basis of plant and special environmental factors of the area. It is worth mentioning that destructive factors caused by unplanned grazing livestock can have the irreparable risks impacts to the mentioned habitats. In order to preparation of the floristic lists of the medicinal plants frequent field visits was done by the research team in the different times and also all of the medicinal species were collected and identified according to the scientific literatures subsequently. The results showed that there were 133 medicinal plant species in the mentioned area so that the major plant families are as follows: Lamiaceae (27 species), Asteraceae (20 species) Apiaceae (13 species), Brassicaceae (10 species), Caryophyllaceae (6 species) and four family Caprifoliaceae, Fabaceae, Polygonaceae and Ranunculaceae each of them (4 species) jointly. Finally, the life forms of plant species were examined according to Raunkier method and the chorotypes of plants species showed that 60.15 % (80 plant species) belonged to Irano-Touranian zone and the other species in addition to Irano-Touranian zone are distributed in other geobotanical zones too.

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## Comparing the Effects of *Glycyrrhiza glabra* Root Extract, Cyclooxygenase-2 Inhibitor (Celecoxib) and Gonadotropin Releasing Hormone Analog (Diphereline) on a Rat Model of Endometriosis

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The purpose of this study was to compare the effects of *Glycyrrhiza glabra* (Licorice), Cyclooxygenase-2 Inhibitor (Celecoxib<sup>®</sup>) and gonadotropin releasing hormone analog (Diphereline<sup>®</sup>) to a control group on endometrial implants in rats. Endometriosis was induced in rats by auto transplantation and after confirmation, the rats were divided into 4 groups that were treated for 6 weeks by normal saline (0.5 ml/day, orally), licorice (3 g/day, orally), celecoxib (50 mg/kg, twice a day, orally) or diphereline (3 mg/kg, intramuscular injection), respectively. At the end of treatments, the mean area, volume, histopathology and Hemosiderin-laden macrophage (HLM) counts of the endometrial implants were evaluated and compared between the four groups. The mean area, volume and HLM counts of the implants in the licorice group were significantly less than the control group. The histopathologic grading of endometrial implants was significantly decreased by licorice compared to the control group. There was no significant change in the mentioned parameters in rats treated by celecoxib compared to the control group. Diphereline was the most potent agent for suppressing the growth of endometrial implants in all of the above mentioned parameters. Licorice decreased the growth and histopathologic grading of auto transplanted endometrial implants. However, Celecoxib had no significant effect and dipherelin had the most potency to decrease the endometrial growth. Licorice may have the potential to be used as an alternative medication for the treatment of endometriosis.

**Keywords:** Endometriosis, Licorice, Cyclooxygenase-2 Inhibitor, Celecoxib, Gonadotropin



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## Alleviating Negative Effects of Salinity Stress in Summer Savory (*Satureja hortensis* L.) by Biochar Application

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Summer savory (*Satureja hortensis* L.) as a medicinal and culinary herb is used in traditional medicines. Salinity is a major stress endangering crop production in arid and semi arid areas. The response of antioxidant enzymes to salt stress were variable [1]. Biochar (BC) is the solid organic material produced from the slow pyrolysis of waste organic materials such as manures agricultural residues [2]. In order to study the effect of biochar on some physiological characteristics and osmotic adjustment of leaf's extract from summer savory under salinity stress, a pot factorial experiment based on completely randomized design with four replications was performed. The treatments were comprised three levels of biochar (0, 1, 2 %w/w of soil) and three salinity levels (0, 40 and 80 mM) in four replications. During salinity stress, plants adapt to osmotic stress by accumulating compatible solutes such as proline and sugar as well as producing antioxidants. According to the results, at the highest concentration of NaCl (80 mM) without using biochar, the highest amounts of soluble protein, proline and soluble sugar contents, catalase (CAT), superoxide dismutase (SOD) and peroxidase (POD) activity were observed. With the addition of biochar, the contents of proline, protein and sugar accumulation in leaves decreased as well as antioxidant enzyme activity. The findings supported the view that biochar can contribute to protect summer savory against salinity stress by alleviating the oxidative stress and regulation of osmolites.

**Keywords:** *Satureja hortensis*, Proline; Protein, CAT, POD, SOD

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## Essential Oil Composition and Antimicrobial Activity of the *Stachys lavandulifolia* in Semirom (Esfahan province)

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*Stachys lavandulifolia* is from family Lamiaceae that is native to different regions of Iran and has different medical applications. Besides that, it has been known as a lung disinfectant and a drug for certain inflammatory diseases. In the present study, in addition to the investigation of chemical compounds of *S. lavandulifolia* occurring in climatic conditions of Vanak, Semirom region (Isfahan province), the antimicrobial effect of its extract against pathogenic microorganisms has been studied. *S. lavandulifolia* shoots were collected from Vanak, Semirom in May 2016 and its essential oil was extracted by water distillation. The compounds of the essential oil were analyzed and identified by Gas Chromatography (GC). To study the extract's microbial effects, broth microdilution and disk diffusion were used. demonstrated that in *S. lavandulifolia* essential oil, 55 chemical compounds were identified, totally comprising 78.073% of essential oil. In addition, *S. lavandulifolia* essential oil was found to contain (+) Spathulenol (14.75%) followed by Beta-phellandrene (12.56%), Thymol (7.51%), and 1, 8-cineole (3.27%). Besides that, this plant has a significant antibacterial effect. Ecological changes have an important role in the types and amounts of *S. lavandulifolia* common compounds and therefore affect its antibacterial property. It was also determined that ecological variation plays an important role in varying types and levels of the main compounds of this essential oil and therefore its antibacterial property. With regards to the antimicrobial activity of this plant on pathogenic bacteria, the results of the present study can lead to new insights into the production of antibacterial plant-based drugs; and since antibiotic resistance is currently increasing, the results of the current study can be important in investigating microbial strains.

**Keywords:** Antibacterial effect, Essential oil, Compound, *Stachys lavandulifolia*, Semirom

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## Effect of Iron and Zinc Nano Chelates on the Morphological Properties of Balangu (*Lallemantia royleana*).

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*Lallemantia royleana* seed is a good source of polysaccharides, fiber, oil and protein. Mucilage creates a protective layer on the digestive gastrointestinal mucosa, so that stimulants such as acids and salt can not contact inflamed or wounded parts, and also prevent stomach acid reflux [1]. In order to investigate the effect of Iron nano- chelate fertilizers and Zinc nano- chelate fertilizers on *Lallemantia royleana*, an experiment was conducted in a completely randomized block design with three replications at Shahed University. The treatment of iron nano- chelate with concentrations of 0 (control), 2000, 4000 and 6000 parts per million and also treatments of zinc nano- chelate with concentrations of 0 (control), 2000, 4000, and 6000 parts per million as soluble. The studied traits Plant height, fresh and dry weight of plant, number of substem plant, 1000 seed weight, germination percentage, seed yield and musilage content. The highest plant height was obtained at a concentration of 6000 parts per million iron and 0 (control). The maximum length of the main panicle length was observed in the amount of interaction between 6000 pieces per million iron-2000 pieces per million particles and the minimum length of main panicle length in 0 (control). No significant correlation was observed between the traits related to mucilage and none of the morphological traits. Dry weight of mucilage and musilage percentage had a significant and negative correlation with grain weight. There was a significant difference between the concentrations of iron in terms of plant height at the 5% probability level, but there was no significant difference during the main inflorescence. In multiple regression analysis, dry weight variables were considered as dependent variables and the rest were compared as independent variables. Only independent variables of plant weight and plant height were included in the regression model. Nineteen variables were reduced to 6 factors in the Varimax rotational factor analysis, which allowed the six factors to justify 72.7% of the total variation in the data.

**Keywords:** *Lallemantia royleana*, Inflorescence, Mucilage, 100 grain weight

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## The Effect of Silver Nanoparticles on Some Physiological and Biochemical Characterization in *Carum copticum* L.

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Ajowan (*Carum Copticum*), from family of Apiaceae is a medicinal plant that its leaves and root are used numerously in traditional medicine as increasing breath and reduction of gastric acid secretion [1]. In order to study the effect of silver nanoparticles on malondialdehyde (MDA), antioxidant enzymes activity such as catalase (CAT), superoxide dismutase (SOD) and ascorbate peroxidase (APX), phenol compounds in Ajowan, this study was conducted as randomized complete block (RCB) whit three replication in Biocenter of Zabol university. silver nanoparticles was in four level (0, 10, 30 and 50 ppm). In comparison with control, the result showed malondialdehyde (MDA), antioxidant enzymes activity such as catalase (CAT), superoxide dismutase (SOD) and ascorbate peroxidase (APX), and phenol compounds increased in 50 ppm. It seems that in concentration higher than 10 ppm, silver nanoparticles, as a biotic elicitor, increases antioxidant enzymes activity and secondary metabolites production in six stage of Ajowan.

**Keywords:** Antioxidative enzymes activity, Malondialdehyd, Phenol compounds

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## The Effect of Chitosan on Antioxidative Enzymes Activity and Phenol Compounds in *Agastache foeniculum* Kuntz

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*Agastache foeniculum* kuntz, a member of a Lamiaceae family, is herbaceous, perennial and fragrant plant. Chitosan is the main compound of fungal species and could be used as a biotic elicitor to improve secondary metabolites [1]. In order to study the effect of chitosan on antioxidant enzymes activity such as peroxidase (POD), glycylglycyl peroxidase (GPX) and poly phenol oxidase (PPO), total phenol compounds, proline and carbohydrate in *Agastache foeniculum* kuntz, this study was done as randomized complete block (RCB) with three replication in biocenter of Zabol university. Chitosan was in four level (0, 100, 150 and 200 ppm). In comparison with control, the result showed antioxidant enzymes activity such as peroxidase (POD), glycylglycyl peroxidase (GPX) and poly phenol oxidase (PPO), phenol compounds, proline and carbohydrate increased in 200 ppm and the amount of phenol compounds, proline and carbohydrate increased in different Chitosan concentration. Thus chitosan, as a biotic elicitor, enhanced antioxidant enzymes activity and secondary metabolites production in six stage in more than 100 ppm.

**Keywords:** *Agastache foeniculum* kuntz, Antioxidative enzymes activity, Proline

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## Effect of Oral Chicory Extract by Mother on Neonatal Jaundice

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Jaundice is a common problem in infants, particularly premature infants (60-80%). The most common treatment of neonatal jaundice is phototherapy; however, traditional and complementary medicine is preferred due to complications of phototherapy in newborns. This study evaluates the effect of oral chicory extract by mother on neonatal jaundice in Imam Reza hospital Kermanshah in 2017. In this clinical trial, 64 neonates with neonatal jaundice diagnosis and hospitalized in Imam Reza hospital Kermanshah were evaluated. The infants were randomly assigned to two groups receiving phototherapy and phototherapy with oral chicory extract by mother. In the intervention group, in addition to the neonatal phototherapy, they were given to their mothers oral chicory extract, twice a day, and 200 cc in any time. During treatment, serum bilirubin was measured and recorded every 24 hours continuously. control infants only received phototherapy; during treatment, serum bilirubin was measured and recorded every 24 hours. The results showed no significant difference in mean bilirubin levels between the two groups on admission ( $P \leq 0.35$ ), while mean bilirubin level of phototherapy infants was significantly higher than that of infants receiving phototherapy and oral chicory extract by mother in 24 hours after intervention ( $P \leq 0.015$ ) and 48 hours after intervention ( $P \leq 0.012$ ). The results showed that oral chicory extract by mother along or with other treatments could be effective in reducing neonatal jaundice.

**Keywords:** Bilirubin, Chicory extract, Jaundice, Neonates, Phototherapy

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## Effects of *Citrus japonica* L. Peel Essential Oil on Acetic Acid Induced Colitis in Rats.

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IBD refers to two different inflammatory conditions, crohn's disease and ulcerative colitis. There are limited drug classes for treatment of IBD as regards, and more effective and less harmful compound for treatment appears to be essential. *Citrus japonica* popularly named kumquat is a native plant in china. The *C. Japonica* peel essential oil (EO) has been reported to have antioxidant (1, 2), anti-carcinogenesis and antimicrobial activities. In this study we prompted to investigate effects of *C. japonica* peel EO collected from north of Iran on acetic acid induced colitis in rats. The EO from peels of *C. Japonica* was obtained by hydro distillation using a Clevenger apparatus. The examined EO was analyzed by gas chromatography/mass spectrometry (GC/MS). The major component of the oil were characterized as limonene (91.4%). Colitis was induced by intra-colonially administration of a 2 ml of 4% (v/v) acetic acid solution and 24 h later, different doses of EO (20, 40 and 80 mg/kg) and sulfasalazine (100 mg/kg) as positive control were administered orally to male Wistar rats (n=6) for 6 days, 24 hours after the last gavages, colons were removed for assessed its macroscopic and microscopic changes and myeloperoxidase (MPO) activity. the macroscopic scores show inflammation in vehicle group. The doses of 20and40mg/kg of EO groups weren't significantly different with Sulfasalazine group (100mg/kg).the histological alteration indicated severe inflammation in Vehicle group while the inflammation was reduced in Sulfasalazine and all EO doses groups. MPO activity was significant at all doses of EO compared with control group (p<0.05). it is concluded that *C. japonica* peel essential oil could effectively reduce inflammation in experimental ulcerative colitis especially at 40mg/kg EO dose.

**Keywords:** *Citrus Japonica*, Essential oil, Acetic acid, Colitis, Rats

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## Evaluation of Mechanical and Antibacterial Properties of Chitosan-*platanus orientalis* Leaves Based Wound Dressing

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During the process of wound healing, wound dressings are used for dermal and Epidermal repairing. this dressings as a permeable physical barrier to oxygen and moisture protect the wound against the penetration of microorganisms.natural biopolymers are widely used in restorative medicine due to the biofeatures such as bicompatibility, Biodegradability and the similarity to the extracellular matrix. biopolymers such as polysaccharides are widely used in the development of wound dressings, because of the abundance in plants and products of the body. however films that are made from them have poor mechanical strenght. In this study anti-microbial properties and the mechanical strength of the Chitosan film were investigated by using the extract and powdered leaves of *platanus orientalis*. The extract-chitosan film shown high tensile strength compared to pure chitosan film. The antimicrobial test was carried by agar Diffusion method and the growth inhibition effects of the films including extract and powdered leaves were tested on the gram positive microorganisms of *Staphylococcus aureus* and *Enterococcus faecalis* and gram negative microorganisms of *Escherichia coli* and *Pseudomonas aeruginosa*. The extract-powder-chitosan films showing the antimicrobial activity on all microorganisms used in the study [1,2].

**Keywords:** Chitosan, Antibacterial, *Escherichia coli*, *Pseudomonas*, *Staphylococcus*

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## Investigating the Effect of Organic-Mineral-Based Emulsion Produced by Specialists of Sothern Khorasan on Improving Saffron (*Crocus sativus*) Yield

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Despite being the biggest producer of saffron in the world, Iran has a modicum saffron yield of about 3.5 kg.ha<sup>-1</sup> [1]. Using Agricultural practices for improving saffron yield due to problems in breeding this triploid crop are considerable. Hence, in addition to mother-corm size (0 to 4 g as small, 4.1 to 8 g as medium and 8.1 to 12 g as big), the effect of an organic-mineral-based emulsion (Omic®) produced by specialists of Sothern Khorasan on saffron yield improvement was studied. Other nutrient treatments including cow manure, humic acid (Humax® 95 – WSG) and control were also added. According the results, mother-corm size factor significantly affected studied traits including stigma dry weight, flower dry weight, number of flowers, number of buds and bud dry weight. The highest and lowest amount of mentioned traits were obtained in big- and small-sized corms, respectively. Stigma dry weight in big-sized corm treatment with 82.22 mg.m<sup>-2</sup> was about 200 and 3.5 times bigger than small-sized (0.43 mg.m<sup>-2</sup>) and medium-sized (24.52 mg.m<sup>-2</sup>) corm treatments, respectively. These results testify the importance of avoiding corms less than 4 g and justify bearing the cost of providing big corms in saffron cultivation. Investigating the main effect of nutrition factor revealed Omic's superiority compared with Humax in most studied traits. Comparing the slope of linear regression between stigma dry weight and corm size (in different levels of nutrition treatment) showed that the highest yield increasing happened in Omic treatment (12.91 mg in exchange for one unit of mother corm weight increasing) which was significantly higher than Humax (4.57 mg in exchange for one unit of mother corm weight increasing). These results strengthen the feasibility of using Omic as an alternative agent for imported organic fertilizers such as Humax in saffron.

**Keywords:** Biocompatible, Organic fertilizer, Linear regression, Stigma, Manure

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## Effect of Different Weed Management Methods on Yield Components and Essential Oil of *Dracocephalum moldavica* L.

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Moldavian balm (*Dracocephalum moldavica* L.) from Lamiaceae family is one of the medicinal and aromatic plants that its essential oil is used widely in medicinal, food, cosmetic and health industrials. Moldavian balm is cultivated in different regions of Iran. Production of medicinal plants faced a number of limitations and constraints such as water shortage, climatic condition and weed infestation. Weeds are one the most important problems in agriculture and cause a significant loss in medicinal plant yield and this can be due to their early emergency, high densities and competitive ability. In order to investigate the effect of weed management methods on yield components and essential oil yield of Moldavian balm an experiment was conducted at Research Farm of the University of Tabriz, Iran in 2016. Experiment was carried out in a randomized complete block design with seven treatments and three replications. Treatments were contains of application of pendimethalin at 4 and 2 L/ha, pendimethalin at 4 and 2 L/ha + straw mulch, straw mulch, weed free and weed infested during whole growing season. According to the results of statistical analysis, weed management treatments had significant effects on growth characteristics, flowering upper parts, yield components, biological yield and essential oil yield. The highest plant height and leaf number per plant were observed in pendimethalin dose of 4 L/ha,+straw mulch treatment. The highest flowering upper parts dry weight among the management treatments was obtained in pendimethalin dose of 4 L/ha + straw mulch that was not significantly different with other treatments. Also the lowest upper parts weight was obtained in weed infested that was not significantly different with straw mulch treatment. The highest biological yield was observed in 100% pendimethalin dose+straw mulch. At all treatments reduction in herbicide dose caused reduction in Moldavian balm grain yield. Among the management treatments the highest essential oil yield was obtained in pendimethalin at 4 L/ha + straw mulch treatment that was not significantly different with other treatments. This study indicated the use of reduced dose of herbicide in combination with wheat straw mulch could be replaced with 4 L/ha (100%) herbicide dose application that is consistent with sustainable production of Moldavian balm.

**Keywords:** Chemical control, Essential oil yield, Pendimethalin, Biological yield, Reduced dose

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## The Investigation of *Stachys inflata* Essential Oil in Hamedan Province

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*Stachys inflata* Benth. is a native plant widely distributed in Iran [1]. Aerial parts of *S. inflata* have been used as a folk medicine and believed it to cure infective, asthmatic, rheumatic and other inflammatory diseases [2]. This study was conducted to investigate the essential oil percentage and components of 7 ecotypes of *Stachys inflata* collected from Hamedan province. The results showed that there was variation in essential oil percentage (0.11 to 0.2%). The most essence percentage belonged to Avarzaman, Koohani and Aznavele regions (0.2%). However there were 22 components in essential oil of studied populations, a great variation was observed in these components. The most Octanol acetate (14.3%), Insensole acetate (13.41%), Sclaren (8.26%) and incensole (7.77%) was observed in Avarzaman, the most  $\alpha$ -pinene (6.18%) and Germacrene D (13.96%) was reported in Aznavele, the most Bicyclogermacrene (10.66%) and phytol (9.52%) was observed in Ekbatan, the highest spathulenole (25.52%) was reported in Asadabad and Hexadecanoic acid (9.46%) in Gamasiyab.

**Keywords:** *Stachys inflata*; Essential oil; Folk medicine

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## Evaluation of Anti-adenovirus Activity of Some Plants from Lamiaceae Family Grown in Iran in Cell Culture

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The family Lamiaceae has included some plants such as thyme species that in Iranian traditional medicine mentioned to have a lot of medical properties [1]. Some of these properties have not approved by original article. The aim of this study was evaluation of anti-adenovirus effect of three plants from Lamiaceae family (*Thymus daenensis*, *Thymus vulgaris*, *Zataria multiflora*) that grown in Iran. The aqueous extracts of plants were prepared and the essential oil of *Thymus vulgaris* was purchased. Cytotoxicity effects of tested compounds were determined. The anti-adenovirus effects of maximum non-cytotoxic concentration of tested compounds were evaluated in cell culture with 100 TCID<sub>50</sub> of adenovirus type 5 by three methods: simultaneous, pre-treatment and post-treatment. For antiviral effect only those concentrations were accepted that completely inhibit cytopathic effect of virus in cell culture [2]. In simultaneous and post-treatment methods, minimum concentration that show anti-adenovirus activity were 12.5, 12.5, 25 and 50  $\mu$ g/ml for *Thymus daenensis*, *Thymus vulgaris*, *Zataria multiflora* aqueous extracts and thyme essential oil, respectively. None of the tested compounds had shown anti-adenovirus effect in pre-treatment method. These results have suggested the potential use of these compounds for treatment of the adenovirus infections.

**Keywords:** Adenovirus, Antiviral effect, essential oil, Extracts, Lamiaceae, *Thymus*, *Zataria*

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## Study of Antifungal Effects of *Silybum marianum* Extract Individually and in Combination with Fluconazole on Clinical *Candida* Isolates in Golestan Province

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Candidiasis is a spectrum of opportunistic fungal diseases that occurs in susceptible individuals. Unfortunately, the resistance of *Candida* to selective antibiotics is increasing. *Silybum marianum*, which belongs to Asteraceae family, is a wild plant that grows in most parts of Iran. This study aims to investigate the effect of *Silybum marianum* extract, both individually and in combination with fluconazole, on the growth of drug-resistant clinical *Candida* isolates. In this descriptive cross-sectional study, *Candida* strains were identified and isolated through biochemical tests after being sampled from 85 suspected cases of Candidiasis. Drug sensitivity to fluconazole was evaluated by broth microdilution method. The minimum inhibitory concentration (MIC) of the *Silybum marianum* extract as well as its antagonistic effects were determined by broth microdilution and agar well diffusion methods. In this study, the highest resistance to fluconazole was reported for *Candida glabrata* (87%) and *Candida albicans* (72.5%). Upon evaluation of antifungal effects of *Silybum marianum* extracts, the maximum diameter for the inhibition zone was seen for the aqueous extract of *Silybum marianum* in the concentration of 250 mg/ml. This parameter was observed for yeast isolates resistant to fluconazole at the mean of 28 mm. Changes to the MIC of the aqueous extract of *Silybum marianum* in the range of 8-4096 µl/ml showed that 28% of *Candida glabrata* isolates and 24.4% of *Candida albicans* isolates resistant to fluconazole did not grow in concentrations with MIC ≥ 1024 µl/ml; this is while in case of *Silybum marianum* extracts in combination with fluconazole, 89.2% of *Candida glabrata* isolates and 94% of *Candida albicans* isolates stopped growing in concentrations greater than or equal to 256 µl/ml (P < 0.05). According to the results of the present study, the aqueous extract of *Silybum marianum* seeds showed proper inhibitory effects on clinical fluconazole-resistant *Candida* isolates at high concentrations. It was also found that the antagonistic effect of *Silybum marianum* extract was approximately four times more when used in combination with fluconazole.

**Keywords:** *Candida*, Fluconazole, *Silybum marianum* extract, Drug resistance

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## Comparison of *Lithospermum Officinale* on Skin Wound Healing in Rats

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Scientific name of Gromwell (*Lithospermum officinale*) is a species of the Boraginaceae family. Gromwell is perennial grasses and pharmacological properties. The aim of this study was to evaluate wound healing after topical *Lithospermum officinale* extract of the aerial parts in rats, After induction of anesthesia in 40 male Wistar rats, each of them was wounded in the back of the box. Wound healing in 4 groups: control (A), 10% Ethanol extract (B), 20% Ethanol extract (C), 40% Ethanol extracts (D) was applied. Measuring and analyzing digital images of wounds treated for 21 days were used. Microscopic studies on days 3, 7, 14 and 21 were sampled from the repair. Healing for all treatment groups was determined. Data were analyzed with the software SPSS18. Results showed that the mean wound healed in group (D) was less than the average level of other lesions (01/0>P). The overall outcome of healing based on histopathological groups (D) better than other groups.



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## The Effects of Hydroalcoholic Extract of *Allium hirtifolium* on Serum NO Level in Male Rats

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Although there are ample reports indicating the effects of *Allium hirtifolium* on various body systems, few information is available about the effects of *Allium hirtifolium* on physiological functions, in particular NO. The purpose of this study was to determine the effects of hydroalcoholic extract of *Allium hirtifolium* on serum levels of NO in male rats. In this study, male Wistar rats were randomly divided into control, normal saline receiving, *Allium hirtifolium* extract (100 mg/kg/body weight) receiving animals of 5 rats in each group. *Allium hirtifolium* extract extract was daily injected intraperitoneally for 7 days. Blood samples were collected using cardiac puncture method serum NO level was measured using spectrophotometry method. Data were statistically analyzed and compared between groups using ANOVA. Serum NO level was not significantly changed in normal saline receiving rats compared with control animals, however, serum NO level was significantly increased in *Allium hirtifolium* receiving animals compared to control rats.

**Keywords:** *Allium hirtifolium*, NO, Rat

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## Effect of Different *Agrobacterium Rhizogenes* Strains and Various Explants on Hairy Root Induction in *Hyoscyamus Pusillus* (Solanaceae)

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The genus *Hyoscyamus* L. belongs to the tribe Hyoscyameae Miers of Solanaceae family with 18 species all over the world and 13 species in Iran. *Hyoscyamus* species are rich sources of tropane alkaloids, mainly hyoscyamine and scopolamine, which are used for their mydriatic, antispasmodic, anticholinergic, analgesic and sedative properties. The development of an efficient protocol for successful hairy root induction by *Agrobacterium rhizogenes* is the key step toward an *in vitro* culturing method for the mass production of secondary metabolites. Hairy root (HR) induction is the result of the infection of plant tissues with *A. rhizogenes* and subsequently integration of root induction plasmid (PRI) T-DNA into the plant genome and its subsequent expression. In the present study, the effect of different *A. rhizogenes* strains on HR induction from various plant organs of *H. pusillus* were investigated. Two-week old seedlings cultured on solid MS medium were used as explant source and their leaf, cotyledon and hypocotyl were then inoculated by four strains of *A. rhizogenes* (A4, A7, A13 and 15834). The inoculated explants were cultured on solid ½ MS medium free antibiotics for 48h and were then sub-cultured on the medium containing 400 mg/L cefotaxime to eliminate the bacteria. Transformation efficiency was determined after two weeks. HRs were observed in leaf and cotyledon but none of them were induced from hypocotyl of *H. pusillus*. The highest frequency of HRs induction was obtained by A13 strain (90%). The frequency of HRs induction in A4, A7 and 15834 strains (in leaf explants) were 68.33%, 66.67% and 70%, respectively. According to our results, A13 strain and leaf explant are suitable for HRs induction in *H. pusillus*.

**Keywords:** *Agrobacterium Rhizogenes*, Hairy root, Plant part, Tropane alkaloids

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## Chemical Composition and Antimicrobial Activity of *Satureja rechingeri* Jamzad at Different Phenological Stages

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*Satureja rechingeri* is an endemic *Satureja* species found in Iran. Variations in essential oil and antimicrobial activities of this species at different phenological stages are reported in this study. The chemical composition of essential oils obtained by hydro-distillation from the aerial parts were determined by GC and GC-MS. A total of 47 compounds were identified in the essential oils of *S. rechingeri* at different phenological stages. The major components of all oils were carvacrol (83.6%–90.4%), p-cymene (0.8%–2.9%) and  $\gamma$ -terpinene (0.6%–2.4%). The antimicrobial activities of *S. rechingeri* essential oils against three bacteria and one fungus were assessed by disc diffusion method and by recording inhibition zones (IZ) and minimum inhibitory concentrations (MIC). The results show that the essential oils of the various phenological stages have high activities against four medically important pathogens.

**Keywords:** *Satureja rechingeri*, Essential Oil, Antimicrobial Activity, Phenological stages

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## Preparation and Analysis of Alginate Honey Hydrogel as a "Wound Dressing" for the Treatment of Burn Wounds.

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The healing process of wounds has been considered as a major problem in patients in the traditional medicine as well as in modern medicine. Honey has been used as an antimicrobial agent as one of the most common methods of repairing and improving these patients from the past. In this study, due to the functional importance of this natural combination in the healing process of wounds, antimicrobial evaluation and healing of honey in combination with alginate Bio-polymer as a biological ulcer in the treatment of ulcers have been targeted. In this study, following the collection of several native honey samples from different parts of the country, structural and biochemical evaluation as well as antibacterial properties of honey adjacent to 4 types of clinical bacteria. In the microbial study of the collected honey, its best concentration in comparison with control concentrations (PBS) was evaluated by method "Agar well Diffusion", and then the composition of honey alginate hydrogel using the best concentration After evaluating and verifying the structure by FTIR, the effect of hydrogel healing in *In vivo* conditions on rats burned and infected with four types of pathogen bacteria was measured. The results show that honeys have the good effect on pathogen bacteria by "Agar Well Diffusion" in *In vitro* conditions. Alginate-honey combined hydrogel was prepared using Optimal conditions, and the study of the above compound by structural FTIR due to the similarity and difference of structural bands in the wave number (1800-1600) indicates the presence of the bond in the combined hydrogel in comparison with the FTIR graph of samples Alginate and CaCl<sub>2</sub>. Also in *In vivo* studies, hydrogel has been shown to be the most therapeutic effect. This effect can be due the presence of honey in hydrogel. It should be noted that animal studies were conducted in both pure honey and honey and alginate composition.

**Keywords:** Wound, Honey, Hydrogel, Antibacterial property



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## Fumigant Toxicity of Two Medicinal Plant Extracts on Potato Tuber Moth

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In this study fumigant toxicity of three different extracts of *Ageratum houstonianum* and *Xanthium strumarium* (Asteraceae family) on adults and first larval instar of potato tuber moth *Phthorimaea operculella* (Zeller, 1873) (Lep., Gelechiidae) was investigated. This insect is one of the important dangerous pests in field and storage condition on potatoes worldwide. For experiments, insects reared in controlled condition of  $26\pm 2^\circ\text{C}$ ,  $50\pm 5\%$  RH and a photoperiod of 16: 8 (L: D) h on potato tubers. For preparing the extracts of tested plants, the fresh leaves of plants collected, washed with distilled water, air dried in shadow condition and room temperature. The hexane, dichloromethane and acetone extracts prepared by maceration method [2]. The fumigant toxicity bioassays carried out in 10 and 100 ml vials (for 1<sup>st</sup> instar larvae and adults respectively). The 1<sup>st</sup> larval instars also adults were exposed to different concentration of given extracts by a piece of filter paper located on the tip of vials [1]. The results revealed that the extracts of studied plant extracts had minor fumigant toxicity effect on adults of PTM and the mortality was not significant in comparing with controls in exposure time of 24 hours, but with increasing the exposure time mortality increased in dose dependent manner. The first larval instars affected by plants extracts in dose dependent manner, although the fumigant toxicity of *X. strumarium* on adults was negligible but the  $\text{LC}_{50}$  values of hexane, dichloromethane and acetone extracts of *A. houstonianum* were 0.284, 0.546 and 0.236 g/l respectively and the slope of dose-response lines obtained from probit analysis (SPSS v15) were  $2.46\pm 0.39$ ,  $1.76\pm 0.2$  and  $1.6\pm 0.3$  for hexane, dichloromethane and acetone extracts of *A. houstonianum* respectively. It suggests that, the acetone, hexane and dichloromethane extracts of this plant could be a potent candidate in non-chemical control of potato tuber moth, in storage condition.

**Keywords:** *Ageratum houstonianum*, Fumigant toxicity, *Phthorimaea operculella*, Plant extract

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## Antifungal Effects of *Zataria multiflora* Boiss, *Mentha Pulegium* and *Mentha piperita* Essential Oils on *Aspergillus flavus*, *Penicillium expansum*. and *Geotrichum candidum*.

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Essential oils are used in medicine and the food industry for their antibacterial and antifungal properties. In this study antifungal effect of *Mentha piperita*, *Mentha pulegium* and *Zataria multiflora* Biosson on the growth of *Aspergillus flavus*, *Penicillium expansum*. and *Geotrichum candidum* were determined. Tube dilution method was used to determine the MIC of the essential oils on tested fungi by using RPMI-1640 medium. MFC of the oils was determined by culturing on PDA medium. Also, the effects of the oils on the growth of the fungi colonies were evaluated by using agar well diffusion method. The results showed that the volatile oil of the *Zataria multiflora* Boiss was the most effective oil, thus MIC and MFC of this oil for *Aspergillus flavus* were 0.001, 0.003 ul/ml and for *Penicillium expansum* were 0.00003, 0.0005 ul/ml and for *Geotrichum candidum* were 0.0001, 0.003 ul/ml respectively. As the results showed, all the essential oils had antifungal activity, thus it is possible to use these essential oils as a natural flavoring and preservative in foods.

**Keywords:** Antifungal, *Zataria multiflora* Boiss, *Mentha pulegium*, *Mentha piperita*

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## Essential Oil Composition, Total Phenolic Content and Antioxidant Activity in *Thymus daenensis* and *Origanum majorana*

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The chemical composition of essential oils isolated by hydrodistillation from the aerial parts of *Thymus daenensis* subsp. *daenensis* Celak, and *Origanum majorana* cultivated in Estahban region, were determined using gas chromatography (GC) and gas chromatography/mass spectrometry (GC/MS). The main components of the oil in *Thymus daenensis* were thymol (69.58), *P*-Cymene (5.71),  $\beta$ -caryophyllene (4.62) and Carvacrol (2.80). In *Origanum majorana*, Trans sabinene hydrate (39.23), Terpinene-4-ol (16.78), (E)-Sabinene hydrate (7.45),  $\delta$ -Terpinene (6.65) and Sabinene (5.20) were the main components in the essential oils. The total phenolic contents 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. Total phenols varied from 17.96 to 46.52 (mg GAE/g dw) and the IC<sub>50</sub> in the radical scavenging assay ranged from 6.91 to 8.44  $\mu$ g/ml. The highest phenolic content and radical scavenging effect was found in *Origanum majorana*. The antioxidant activities of the plant extracts significantly correlated with their total phenolic contents ( $R^2=0.9578$ ).

**Keywords:** *Thymus daenensis*, *Origanum majorana*, Essential oil, Phenolic content

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## Physiological and Biochemical Responses of Black Seed (*Nigella Sativa* L.) Medicinal Plants to Salicylic Acid Under Salinity Stress

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A pot experiment was conducted focusing on the effects of salicylic acid on the Physiological and biochemical of black seed (*Nigella sativa* L.) medicinal plants under salinity stress conditions. A randomized complete design with factorial arrangement with three replications was used. The treatments consisted of three levels of NaCl salinity (0, 85 and 171 Mm.) and three levels salicylic acid (0, 1 and 2 Mm.) was sprayed on the leaves. Seed culturing was done in greenhouse and plants irrigation with the help of Hoagland nutrition solution. During vegetative growth, proline, chlorophylls, carotenoid, MDA, peroxidase and catalase were measured. Results showed that salinity stress significantly reduced chlorophylls and carotenoid contents however increased proline, MDA, catalase and peroxidase in leaves. salicylic acid increased photosynthetic pigments, proline, catalase and peroxidase but decreased MDA in (*Nigella sativa* L.) medicinal plants. Interaction effect of salinity stress and salicylic acid has a significant effect on proline, photosynthetic pigments and MDA [1,2].

**Keywords:** Salicylic Acid, Salinity, Proline, *Nigella sativa* L.

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## The Effect of Harvesting Time on Essential Oil Composition of *Ziziphora clinopodioides* L.

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In order to investigate the effect of different harvesting times on essential oil composition of *Ziziphora clinopodioides* in 2015 season. The aerial parts of *Z. clinopodioides* were harvested in different growth stages (pre-flowering, full flowering and post flowering) in natural habitat of Gardaneh-Sabz region of Estahban area, Fars province. Essential oils of different harvesting times were obtained by hydro-distillation using Clevenger- type apparatus and analyzed by GC and GC/MS. In essential oil obtained from different harvesting times, 44, 44 and 48 components were identified respectively, that pulegone, p-Menth-3-en-8-ol, neo-Menthol and piperitenone were the main components in 3 different harvesting times. The amount of pulegone as the main components of essential oil increased in pre-flowering and reduced in full-flowering stages, while the amount of piperitenone was higher in full-flowering stage than other harvest times.

**Keywords:** *Ziziphora clinopodioides*, Essential oil, Phonological stages, Pulegone

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## Effect of Dietary Inclusion of Olive Leaf (*Olea europaea* L.) Powder on Blood Antioxidant Parameters and Immune System the in Broiler Chickens

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This study was conducted to investigate the effects of different dietary levels of olive leaf powder (OLP) as a natural antioxidant on blood antioxidant parameters and immune system in broilers. A total of 300 one-day-old Cobb500 broilers were used in a completely randomized design with 5 treatments, 3 replicates and 20 chicks for each replicate, up to 42d. The experimental diets included: corn-soybean meal basal diet (negative control), basal diet with 250 mg/kg of alpha-Tocopheryl acetate (positive control) and three basal diets containing 2, 2.5 and 3 percent OLP. The results showed that OLP and alpha-Tocopheryl acetate increased significantly activity of the antioxidant enzymes SOD and GPX in the blood plasma in comparison with negative control ( $P < 0.05$ ). Total antibody titer and immunoglobulin M were increased significantly in comparison with negative control in the primary response in treatments containing OLP and alpha-Tocopheryl acetate ( $P < 0.05$ ), but immunoglobulin Y was not significantly different in treatments. Total Antibody titer, immunoglobulin M and immunoglobulin Y in the secondary response to SRBC injection showed no significant difference in treatments. Dietary inclusion of OLP up to 3 percent in the broiler diets is recommendable, because it could increased antioxidant blood enzymes and also improved immune system.

**Keywords:** Antibody titer, Antioxidant enzymes, Broiler, Immunoglobulin, Olive leaf

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### Comparison of Antioxidant Activity and Effects of Breads Containing Sesame and Flaxseed on The Lipid Profile of Patients in the Stage I Hypertension

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Free radicals cause oxidation of LDL in the vessel walls that is the first step in the developing of atherosclerosis. Raise in the lipid profile is also a very important risk factor for cardiovascular diseases. Since there are several reports indicating that flaxseed and sesame are enable to decrease oxidative stress and plasma lipid levels, we decided to compare the antioxidant activity and effects of breads containing sesame and flaxseed on the lipid profile of patients in the stage I hypertension. This was a randomized one-side blinded clinical trial. Eligible individuals were selected among patients attending Yazd Cardiovascular Research Center. After collecting demographic and nutritional information, they were randomized to two groups of sesame and flaxseed. They received breads containing 30 grams of either flaxseed or sesame powder for 14 weeks. Measured outcomes included malondialdehyde (MDA), cholesterol, triglyceride, LDL, and HDL. These parameters were measured at the beginning, seventh week, and at the end of the study. Questions about eating habits and physical activities were also asked at these times. To be sure patients consumed their breads properly; they were regularly contacted either face to face or by phone. In both groups, waist circumference decreased considerably ( $p=0.01$  for sesame and  $p=0.001$  for flaxseed). The ratios of waist to hip did not differ significantly inside each group. BMI of participants in both sesame and flaxseed groups decreased drastically ( $p=0.02$ ,  $p=0.001$ , respectively). MDA decreased significantly in the sesame and flaxseed groups ( $p=0.001$ ,  $p=0.01$ , respectively). Flaxseed could decrease triglyceride considerably ( $p=0.006$ ), but this was not observed with sesame ( $p=0.2$ ). Cholesterol and LDL did not differ drastically by these two seeds. HDL increased considerably in the sesame group ( $p=0.001$ ), however; this did not happen in the flaxseed group ( $p=0.08$ ). Flaxseed and sesame could similarly decrease waist circumference and BMI. No considerable change was observed in the lipid profile. Only, flaxseed could decrease triglyceride and sesame increased HDL. Interestingly, both seeds decreased MDA.

**Keywords:** Sesame, Flaxseed, Lipid Profile, Malondialdehyde

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### Effects of Aqueous Extracts of *Achillea millefolium* and *Marrubium vulgare* on Efficiency of Entomopathogenic Nematodes Against *Phthorimaea operculella*

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Combination of different pest biocontrol agents in integrated pest management programs is amongst the most promising methods for enhancing control efficiency. In addition to increasing the virulence, combination use of biocontrol agents has impact on developing resistance phenomenon. In recent years plant extractions have been extensively screened for their potential as insecticide. In this research, combination effects of aqueous extracts of *Achillea millefolium* and *Marrubium vulgare* with three species of entomopathogenic nematodes (EPN), *Heterorhabditis bacteriophora*, *Steinernema feltiae* and *S. carpocapsae* have been evaluated against an important potato key pest, *Phthorimaea operculella*, potato tuber moth (PTM). Aqueous extract of plant foliage prepared using maceration method. Foliage were washed with distilled water and dried in room temperature followed by maceration method. Extraction completed by rotary evaporation of solvent in 40°C and 250 rpm. Last instar larvae of Great Wax Moth, *Galleria mellonella*, were used for mass rearing of EPNs. Sublethal doses including LC<sub>10</sub>, LC<sub>30</sub> of EPNs and LC<sub>10</sub>, LC<sub>30</sub>, LC<sub>50</sub> of plants aqueous extracts were determined and then involved in further bioassay by loading combination treatments on a leaf area of potato. The kind of interactions, between EPNs and plants determined by the procedure described by Finney (1964) [2]. A chi-square test were developed according to method developed by Koppenhöfer and Kaya (1997) and results were compared to the tabulated  $X^2$  for  $df=1$ . Interaction results obtained were completely different regarding two plant extracts. Nearly in all combination treatments of EPNs and *A. millefolium* aqueous extracts, a synergistic effect were recorded, but for EPNs and *M. vulgare* combinations, all interactions had an antagonistic or additive effects. Statistical parameters were: *S. feltiae* and *A. millefolium*:  $M_{NA}$  (LC<sub>10</sub> & LC<sub>10</sub>)= 50%, D=30%,  $P<0.005$ ,  $M_{NA}$  (LC<sub>30</sub> & LC<sub>10</sub>)= 88%, D=59%,  $P<0.005$ ; *S. carpocapsae* and *A. millefolium*:  $M_{NA}$  (LC<sub>10</sub> & LC<sub>10</sub>)= 50%, D=29%,  $P<0.005$ ,  $M_{NA}$  (LC<sub>30</sub> & LC<sub>10</sub>)= 65%, D=28%,  $P<0.005$ , and for *H. bacteriophora* and *A. millefolium*:  $M_{NA}$  (LC<sub>10</sub> & LC<sub>10</sub>)= 33%, D=14.3%,  $M_{NA}$  (LC<sub>30</sub> & LC<sub>10</sub>)= 55%, D=15.3%,  $P<0.05$ . In all combinations, the interaction of EPNs with *M. vulgare* were additional or antagonistic. These results show that *M. vulgare* aquaous extract may has adverse effects on efficiency of EPNs as a result of strong anticacterial property of this plant.

**Keywords:** *Achillea mellifolium*, Antagonistic effects, EPN, *Marrubium vulgare*

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## **Increasing the Efficiency of *Bacillus thuringiensis* by Methanolic Extracts of *Falcaria vulgaris* Against *Phthorimaea operculella***

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Integration use of different pest control tools is an important part of integrated pest management programs in which biological control constitute an essential component of IPM programs. Enhanced efficacy of biocontrol agents in the combination use of other components has been recently shown. Increasing the efficiency of control agents' especially microbial agents because of many advantages in comparing with conventional pesticides is so important. One of the useful techniques is combined use of two or more agents. This method in addition with increasing the toxicity has beneficial effects on preventing the pest resistance development. For evaluating such possibility in Potato tuber moth (PTM), *Phthorimaea operculella*, IPM, as one of the important pests of potatoes, virulence of *Bacillus thuringiensis* Var. kurstaki was evaluated in the presence of methanolic extract of *Falcaria vulgaris* against first instar larvae of *P. operculella*. Insects were reared on potato tubers in controlled condition (26±2°C, 50±5% RH and a photoperiod of 16 hrs light). Potato foliage was washed with distilled water, and then dried in room temperature. Extraction carried out using maceration method [1]. Three expected sublethal dose of Bt and plant extracts including LC<sub>10</sub>, LC<sub>30</sub> and LC<sub>50</sub> determined and then virulence on larva was again evaluated in different treatments as an observed mortality ( $M_{BF}$  mortality of PTM under BT and methanolic extract combination). Described method by Finney (1964) [2] was involved for data analysis in which calculated chi-square according to:  $\chi^2 = (M_{BF} - M_E)^2 / M_E$  is compared to the  $X^2$  table value for  $df=1$ . Interaction was considered synergistic or antagonistic when the calculated  $X^2$  value exceeded the table value. Results clearly showed that interaction between Bt and methanolic extract across all studied exposure time synergistically affected virulence against PTM regardless of mode of combination, highest and lowest synergistic effects were recorded at LC<sub>50</sub> BT & LC<sub>50</sub> *F. vulgaris* (D=22.22%) and LC<sub>50</sub> BT & LC<sub>30</sub> *F. vulgaris* (D=19.11%), respectively.

**Keywords:** *Bacillus thuringiensis*, *Falcaria vulgaris*, Plant Extract, Synergistic effects

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## **The Effect of Salinity on Physiological and Morphological Traits of *Sanguisorba officinalis***

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Salinization is increasing on a global scale, decreasing average yields for most major medicinal plants. The effects of salinity on *Sanguisorba officinalis* were studied during germination and growth period. Seeds were germinated at six salinities (0, 25, 50, 75, 100 and 125 Mm) to determine optimal conditions for germination and growth. The experiment was carried out using factorial based on completely randomized design with three replications. Data variance analysis showed that seed germination of *Sanguisorba officinalis* was significantly affected by salinity. The results showed that, increasing in salinity decreased all growth parameters. Salinity stress decreased shoot and root length, root dry weight and chlorophyll contents. Proline content and soluble carbohydrate were increased with enhance of NaCl concentration in seedlings. As saltiness increases until 125 Mm resistance natural responses in this plant gets worse considering high decrease in chlorophyll amount and strategy of more production about proline and sugar solution. These results suggest that *Sanguisorba officinalis* has potential utility as a medicinal plant in saline environments.

**Keywords:** Salt stress, Germination rate, Proline, Chlorophyll, Growth stage



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**Investigation of Super Absorbent Polymers and Zinc Sulfate on the Yield and Yield Components of (*Calendula officinalis* L.)**

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*Calendula officinalis* L. is one of the most valuable medicinal plants of Asteraceae and is widely used in the pharmaceutical, health, and food industries. To evaluate the effect of different treatments of super absorbent and zinc sulfate fertilizer on the yield and yield components of *Calendula officinalis* L., this experiment was conducted at the Islamic Azad University of Khoy. This was a factorial experiment using as the first factor super absorbent polymers at four levels of soil (0, 4, 6, 8 g / kg) and as the second factor 4 zinc sulfate at 0, 25, 50, and 70 mg per pot (based on a randomized complete block design with three replications). The results showed that super absorbent polymers had a significant effect on all yield traits, but Zn sulfate fertilizer only had a significant effect on flower diameter, number of stems, total biomass with seeds, total biomass yield, seed yield, and harvest index. The interaction of the super absorbent polymers and zinc sulfate fertilizer increased plant height, total biomass with seeds and flowers, seed weight, and flower and seed harvest index, whereas the diameter of flowers, number of stems, dry flower yield, flower number per m<sup>2</sup>, and seed yield were not affected. Super absorbent polymers with zinc sulfate fertilizer had the greatest effect on most yield traits and had a positive effect on increasing the yield components of *Calendula officinalis* L., which improved grain yield. The use of super absorbent polymers can improve the water holding capacity of the soil, which reduces the need for water and improves yield in arid and semi-arid areas.

**Keywords:** Pot Marygold, Harvest Index, Components, Biomass

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**Evaluation of Growth and Production of (*Aloe vera* L.) After Treatment with Different Levels of Vermicompost and Nitrogen Fertilizer**

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To study the effect of vermicompost and nitrogen on the growth and production of *Aloe vera*, a factorial experiment was conducted in a randomized, complete block design with 16 treatments and four replications in the greenhouse of the Faculty of Agriculture at Azad University of Khoy in 2015–2016. Treatments included four levels of vermicompost (Control, 75, 150, and 200 g per pot) and four levels of nitrogen fertilizer (N1: control, N2: 500, N3: 1,000, and N4: 1,500 mg per pot). At the end of the plant growth period, traits such as plant height, number of leaves, leaf diameter, number of suckers, number of leaf suckers, sucker weight, sucker height, and total biomass were measured. The results showed that application of 150 g of vermicompost and 1,000 mg of nitrogen had the greatest effect on growth traits, and application of 200 g of vermicompost and 1,500 mg of nitrogen had the greatest effect on sucker characteristics, so that the highest number of suckers was obtained by using 200 g of vermicompost and 1,000 mg of nitrogen. However, simultaneous application of 150 g of vermicompost and 1,000 mg of nitrogen had the greatest effect on plant height, leaf number, and leaf diameter, and treatment with 200 g of vermicompost and 1,500 mg of nitrogen had the greatest effect on the number of suckers, stem weight, number of leaves, height, total biomass and Aloin content. Therefore, simultaneous use of vermicompost and nitrogen fertilizer in *Aloe vera* cultivation plays an important role in the production and enhancement of sucker and plant performance [1,2].

**Keywords:** Aloe, Sucker, Yield, Organic Fertilizer

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## Effects of Menthone and Piperitone on Growth, Chlorophyll a and $\beta$ -carotene Production in *Dunaliella salina*

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Recently, studying essential oils and secondary metabolites of plants and microalgae have received much attention. The biosynthesis of the secondary metabolites is strongly influenced by different environmental factors. Monoterpenes as a main fraction of essential oils of fruits and vegetables have many clinical applications. They could inhibit the carcinogenesis processes and therefore might be effective in treatment of cancers. *Dunaliella salina*, a photosynthetic green microalga is known as a rich source for  $\beta$ -carotene production. In this study, the effects of some monoterpenes including menthone and piperitone was investigated on yield of product ion of  $\beta$ -carotene were studied. Menthone and piperitone as parameters of stress can make tensions to the medium of *D. salina* increasing its  $\beta$ -carotene and chlorophyll a content in every single cell but on the other hand these two monoterpenes cause a decrease in the concentration of  $\beta$ -carotene and chlorophyll a [1,2].

**Keywords:** *Dunaliella salina*, Monoterpenes, Menthone, Piperitone, Chlorophyll a,  $\beta$ -carotene

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## *In vitro* propagation of *Rosa damascena* by Enhancement of Nutrient Medium and Concentrations of Plant Growth Regulators

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*Rosa damascena* Mill is the most important scented rose species cultivated for rose oil production. This plant and the essential oil extracted from this plant have various applications in perfume and in food industries. They are used as antibacterial, antioxidant, and as flavoring agents. Tissue culture technique plays an important role in propagation of this plant considering difficulties like deficiency of stock plants, time consuming and transferring diseases by vegetative propagation methods. We developed an efficient and cost-effective method for rapid and high-quality shoot multiplication and *in vitro* rooting using nodal explants. In order to explant disinfection, 2.5 or 5% sodium hypochlorite (NaClO) for 2.5, 5 and 7 min. and 0.1 and 0.2% mercury chloride (HgCl<sub>2</sub>) for 3 or 4 min were used. The different medium composition was achieved by modifying NH<sub>4</sub>NO<sub>3</sub> and KNO<sub>3</sub> concentrations in Murashige and Skoog medium and by replacing Fe-EDTA with Fe-EDDHA. The effects of 6-benzylaminopurine (BAP) (0, 0.25, 0.5, 1 and 2 mg/L), indole-3-butyric-acid (IBA) (0 and 0.2 mg/L) or thidiazuron (TDZ) (0 and 1.5 mg/L) supplemented in liquid and gelled (agar, Merck; 8 g/L). media were compared too. Number of leaves (23.1 ± 0.40) and shoot length (4.8 ± 0.09 cm) were improved in the medium containing 1450 mg/L NH<sub>4</sub>NO<sub>3</sub> and 1700 mg/L KNO<sub>3</sub>. Proliferation rate (1.1) in this medium was significantly higher than treatment of 1320 mg/L NH<sub>4</sub>NO<sub>3</sub> and 1520 mg/L KNO<sub>3</sub>. Shoot number was not significantly affected by hormonal concentration. Liquid medium resulted in significantly higher shoot length (2.5) than solid medium. Solid media containing 1.5 mg/L TDZ showed the highest proliferation quality. Fe-EDDHA did not have a significant effect on proliferation compared with FeEDTA. The results showed that there was not a significant difference between different treatments on rooting percent (45%) [1,2].

**Keywords:** *Rosa damascena*, Tissue Culture, Explant, Benzyl Amino Purine, Thidiazuron

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## Analysis of Phenolic Contents, Antioxidant and Flavonoid in Some *Papaver bracteatum* Collected from Iran

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*Papaver bracteatum* (Iranian poppy) is a potential crop for the pharmaceutical industry. Several features make it an attractive alternative to *Papaver somniferum*, the traditional raw material for morphine and codeine production. The alkaloid thebaine which is found at high concentrations in its capsules is readily converted to codeine and other drugs. The aim of this study was to identify the various active compounds like antioxidant, Phenolic contents and flavonoid contents present in the capsule, root and dried body plants of *Papaver bracteatum*, collected from some region of Iran. To do this, the capsules, root and growth shape of some plants were collected after capsule maturity stages. The result show that the highest antioxidant activity in capsules was in papavers plants collected from Malard and Namin of Ardebil. The antioxidant activity of root and dried plants body respectively were in papavers from Hir of Ardebil (mean 87.15) and Garmas of Sari Dareh (mean 65.34). The lowest content of antioxidant activity of capsule, root and dried plant body respectively were in IredMosa and Malard. A relatively high and low content of phenol compounds in capsules was detected in IredMosa (mean 44.7) and Ardebil region (mean 27), for root and plant body result show us the highest content were in poppy from Ardebil and Khalkhal- Asalam. For flavonoids contents of the papavers capsules collected from Shabanlo (mean 3.65) and Hir (mean 1.34) were the highest and lowest respectively. The most flavonoid's content in root and dried plants body were shown at the Shabanlo (mean 4.24) and Meshkinshahr (mean 4.58). On the base of phytochemical analysis, the important diversity of observed traits has been recognized in agro-climatic conditions of Iran and knowledge about chemical difference between *P. bracteatum* in Iran [1].

**Keywords:** *Papaver bracteatum*, Alkaloid, Antioxidant, Phenols, Flavonoid

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## Effect of Pretreatment of Iron Nanomaterials on the Characteristics of Husky spp. *Hyssopus officinalis* L.

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Hyssop (*Hyssopus officinalis* L.) is a medical plant which is traditionally been used to treat Asthma and cold. In addition, the Hyssop extract show great antifungal properties. This study was conducted to investigate the effects of different levels of iron fertilizers with the size of nano and micro scale on seed germination properties of *Hyssopus officinalis* L. A factorial experiment was conducted in a completely randomized design with three replications in seed laboratory of Ramin agriculture and Natural Resources University Khuzestan in Dec 2017. Seed imersed in the nano fertilizer concentrations (0, 250, 500, 1000, 2000, and 4000 ) for the primed durations of 6, 12, and 24 hours. The results showed that the different concentrations of nano-fertilizer of iron chelate exhibited the significant effects on the germination characteristics (germination percentage, mean germination time, germination rate and germination rate). Our results revealed that the Iron nano fertilizers could produced toxicity effects on germination of the seeds of Hyssop and reduced the percentage, speed, germination and seed vigor and increased average germination time. There was no significant difference between the concentrations of 250 and 500 ppm, with control. It is concluded that, nano scale of Iron chelate at the concentrations of higher than 1000 ppm, could produce toxicity and inhibit normal seed germination in Hyssop.

**Key words:** Seed germination, Hyssopus plant, Iron nano fertilizer



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## Identification of Aromatic Plants of Pardis-Shiraz

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Aromatic plants are important natural resources because they have valuable compounds which are used in medicines, perfumes and as flavoring agents for food. Pardis region is located in 15 Km of Northwest of Shiraz. The lowest and highest altitude of the area varies from 1760 to 1870 meters. Different habitat of Pardis have resulted in flora variation. The floristic studies of Pardis were carried out in 2012 and 2013. The plants were collected and identified by microscopic studies and also with the help of Iranian Flora and different scientific references. The plants were conserved in Herbarium of Islamic Azad University, Shiraz Branch. The medicinal and aromatic plants at Pardis included 122 species belong to 104 genera and 33 families. The life forms of plants included 50.8% therophyte, 34.4% hemicryptophyte, 5.7% chamaephyte, 4.2% cryptophyte, 3.3% phanerophyte and 1.6% geophyte. There were 31 species of aromatic plants in Pardis. The results showed that the most frequent aromatic species belonged to four families namely, Lamiaceae, Apiaceae, Asteraceae and Fabaceae. Lamiaceae with 15 species had the most species than the other family. There were the most species in the genera of *Salvia*, *Ajuga* and *Achillea*. The results of this study indicated a richness of medicinal and aromatic plants in Pardis of Shiraz.

**Keywords:** Aromatic plants, Medicinal Plants, Life forms, Fars province, Pardis- Shiraz

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## Essential Oil Composition, Total Phenolic Content and Antioxidant Activity of *Thymus lancifolius* under Different Ontogenesis Conditions

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*Thymus lancifolius*, is one of the endemic *Thymus* species in Iran. The purpose of this study was to evaluate essential oil composition and amount of phenolic content and antioxidant activity of this species under different ontogenesis conditions. For this purpose the aerial parts of cultivated *Thymus lancifolius* were collected and dried in two (pre-flowering and full-flowering) stages from Medicinal and Aromatic Plants Experimental Garden (MAPEG) of the Estahban branch, Islamic Azad University. The chemical composition of essential oils obtained by hydro- distillation from the aerial parts were determined by GC and GC-MS. The major components of the essential oil in the pre-flowering stage were Geraniol (81.30%), Geranyl acetate (6.84%), Nerol (3.90%), Geranial (1.95%), Neral (1.55%) and (E)-Caryophyllene (1.04%) and the major components of the essential oil in the full flowering stage were Geraniol (82.99%), Geranyl acetate (6.78%), Nerol (2.76%), (E)-Caryophyllene (1.67%), Geranial (1.34%), Neral (1.01%). Then the methanolic extract of plant were prepared. Total phenolic content and the antioxidant activity of methanolic extracts were determined with the Folin-Ciocalteu reagent and by the 2, 2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging respectively. The total phenolic content and antioxidant activities of the methanolic extracts were determined with the Folin-Ciocalteu reagent and by the 2, 2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging respectively. Total phenolic content were 75.34 and 86.43 mg GAE/g dw for pre and full flowering stages respectively. The IC<sub>50</sub> values in the radical scavenging assay in the pre-flowering stage was 391.30 mg/L gallic acid and at full flowering stage was 337.5 mg/L gallic acid. The results of this study showed that this plant has good phenolic content and antioxidant activity. Different ontogenesis conditions have significant effect on total phenolic content and antioxidant activity. And also the results show that, different ontogenesis conditions not significant effect on essential oil compositions.

**Keywords:** Antioxidant activity, DPPH, Essential oil, Gas chromatography

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## The Effect of Methanol Spraying as a Biological Stimulus on Seed Yield and Mucilage of (*Descurainia sophia* L.)

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*Descurainia sophia* L. is one of the most valuable medicinal plants in which the consumption of its seeds in the pharmaceutical industry is important for the production of mucilages economically. Methanol spraying as a biological stimulant on three carbonaceous plants, can increase carbon dioxide stabilization and reduce respiration, resulting in more dry matter in these plants. This experiment was carried out in a field experiment in Khoy city based on randomized complete block design with five treatments and three replications. Spraying was carried out during the growing season three times at intervals of 12 days once. The treatments consisted of the control treatment (distilled water without methanol application) and aqueous spray 4 different concentrations of methanol (containing 10, 20, 30 and 40% vol.). Foliar application of different concentrations of methanol had a significant effect on number of plant stem, number of plant leaves, plant dry weight, number of pods per plant, number of seeds per pod, grain yield, grain mucilage yield, grain ash, grain inflation index ( $p \leq 0.01$ ), plant height and 1000 seed weight ( $p \leq 0.05$ ). Regular methanol spraying as an active bioavailable and a new method in the production of medicinal plants improved seed yield and mucilage of *Descurainia sophia* seed. Generally, the highest values for the evaluated properties were obtained in the induction of 40% volumetric methanol solution.

**Keywords:** Seed yield, Mucilage, Methanol, Biomass, (*Descurainia sophia* L.)

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## Effect of Salt Stress on Some Phological and Biochemical Characteristics in *Artemisia dracunculus* L.

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Salinity is an environmental stress that limiting growth and development in plants. In this study, it was investigated the effect of salinity on dry weight, fresh weight, total protein, proline, and carbohydrates in pennyroyal species. Seeds were sown in Tref peat in greenhouse conditions with 14 h light/ 10 h dark period per 24 h and day/ night temperatures of 24/ 20 °C. Then, 60 days seedlings transferred to pots containing perlite and grew in hoagland solution with different salt concentrations of 0, 25, 50, 75, 100 mM. Seedlings were harvested for physiological and biochemical analyzes, after 4 weeks. Results indicated that total soluble sugars, free amino acids and proline content increased with increasing salinity. Contrast, total protein content, dry weight, number of leaves and plant tributaries saltwort significantly decreased with increasing salinity. Overall results suggest that (*Artemisia dracunculus* L.) salt tolerant through the synthesis of compatible solutions. Based on these results, (*Artemisia dracunculus* L.) can grow in saline and alkaline soils.

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## Evaluation of the Effect of *Saturejarechingeri* Essential Oil on the Growth of E.coli O157: H7 in Refrigerated Sheep Meat

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Microbial growth is a primary cause of corruption of refrigerated meat. The main ingredients of *Saturejarechingeri* essential oil are carvacrol, thymol, linalol and p-cymene, which have very strong antibacterial effects. In this study the effect of this essential oil on the growth of E. coli O157: H7 in sheep meat was evaluated for a period of 8 days, in concentrations of 0, 0.05, 0.15, 0.5% and at temperatures of 5 and 8°C. The results showed that by increasing this essential oil concentration in sheep meat to 0.5% and evaluating at temperature 5°C the bacterial growth rate decreased, to a growth rate lower than other treatments.



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## Allocation of Photoassimilates in Different Parts of Saffron During Growing Season

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Understanding the source-sink relations during different phenological stages of crops is a main topic in crop physiology, which has not been investigated properly in saffron. In this study saffron biomass partitioning was studied during its growth cycle under field condition in Sarayan faculty of agriculture, (University of Birjand), Iran, during 2016-17. Plant sampling was done 10 times during the crop growth cycle. In each sampling date five plants were harvested and then the amounts of corm dry weight, root dry weight and leaf dry weight were measured. First autumnal irrigation was done in 12 October and it was considered as a criterion for start of growing season. In the first two months of growth, about 60% of mother corms reservoirs were used for flowering and root and leaf production. Root and leaf dry weight increased up to the 100<sup>th</sup> and 140<sup>th</sup> day of the plant growth cycle, respectively, followed then by decreasing trends. Contrary to common belief, even in mid-April, a number of the roots were alive and active. Corm production rate was slow up to 110 days after the onset of growth (end of January) and then increased at a relatively constant rate to the end of vegetative growth. The weight of the replacement corms began to increase from mid-January and the highest corm growth rate was during the last month of growing season. Crop growth rate and relative growth rate had two incremental points, one between the days of 100 and 140<sup>th</sup> and the other between the 180<sup>th</sup> and 200<sup>th</sup> of the growing season. Active period of corm growth was between 125 and 180 days after the onset of growth. Reallocation of photo-assimilates from leaves to replacement corms (~530 kg ha<sup>-1</sup>) was observed at the end of growth season. Results of similar study revealed that saffron has a critical stage for biomass partitioning during its life cycle, which is located between 120 -150 days after the beginning of the growth season. Before the critical partitioning stage, the leaf and root growth are a priority and after that, replacement corms become the main sink. The findings of current study is useful for saffron fertilization. It seems that before the critical allocation stage (~ 20 January), the fertilizer application in the soil and then the foliar application of nutrients is beneficial for growth of saffron.

**Keywords:** Biomass partitioning, Corm growth rate, Medicinal plants, Replacement corm

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## Chemical Composition and Antibacterial Effects of Essential Oil of Five Medicinal Plants Against Infectious Bacteria

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In recent years fundamental research on medicinal plants in medicinal plant research centers all over the world, particularly Iran is increasing for the detection of medical effective agents and effect on biological pathogens. This study was aimed to determine the antibacterial effects of essential oil of *Pulicaria gnaphalodes*, *Ducrosia anethifoli*, *Trachyspermum copticum*, *Foeniculum vulgare* Mill and *Majorana hortensis* Minch plants against *Proteus vulgaris*, *Pseudomonas aeruginosa* and *Shigella boydii* bacteria. In this descriptive study, standard strains of *Proteus vulgaris*, *Pseudomonas aeruginosa* and *Shigella boydii*. Were obtained from school of veterinary medicine Shiraz. The effect of essential oils of medicinal herbs on the growth of bacteria was determined by disc diffusion, then MIC (Minimum Inhibitory Concentration) and MBC (Minimum Bactericidal Concentration). The analysis of the plants was measured by gas chromatography and GC method. The analysis of the components of the EOs by gas chromatography mass spectrometry the identification of 63 compounds. All essential oils tested in the present study displayed antibacterial activity on three bacterial strains, but *T. copticum* essential oil showed more effective activity than tetracycline antibiotics. However differences were observed between antibacterial activities of the essential oil. Antibacterial efficacy shown by these plants provides a scientific basis and thus, validates their traditional uses as homemade remedies. Isolation and purification of different phytochemicals may further yield significant antibacterial agents.

**Keywords:** Essential oil, Antibacterial, Disc diffusion, Bacteria infection

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### Inhibitory Effect of Five Essential Oils as Antimicrobial Agent on *Corynebacterium pseudotuberculosis*

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*Corynebacterium pseudotuberculosis* is the etiological agent of caseous lymphadenitis (CLA), a common disease in small ruminant populations throughout the world. Once established, this disease is difficult to eradicate because drug therapy is not effective and because the clinical detection of infected animals is of limited efficiency. In response to the propagation of bacteria resistant to many antibiotics, the discovery of new and more efficient antibacterial agents is inevitable. The present study was designed to evaluate the antimicrobial activity of five essential oils of medicinal plants. In this study, the antibacterial effect of *Pulicaria gnaphalodes*, *Ducrosia anethifolia*, *Carum copticum*, *Foeniculum vulgare* and *Majorana hortensis* essential oils against *Corynebacterium pseudotuberculosis* were studied. The effect of essential oils of medicinal herbs on the growth of bacteria was determined by disc diffusion method and tetracycline was used as a control. Each essential oil tested in the present study displayed antibacterial activity on three bacterial strains except *Pulicaria gnaphalodes* and *Ducrosia anethifolia*. However differences were observed between antibacterial activities of the essential oils. Antibacterial efficacy shown by these plants provides a scientific basis and thus, validates their traditional uses as homemade remedies. Isolation and purification of different phytochemicals may further yield significant antibacterial agents.

**Keywords:** Essential oil, Disc diffusion, Bacteria infection

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### Improvement of Qualitative and Quantitative Egg Production by Using Herbal Plants in Japanese Quails.

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This experiment was conducted to investigate the effects of some nutritional herbal plants powder on growth performance, Biochemical factors and Qualitative agent in Japanese quail eggs. These plants include: *Trachyspermum copticum*, *Majorana hortensis* Minch, *Stachys lavandulifolia* Vahl and *Zingiber officinale* that the major compounds of their essential oils were identified using gas chromatography-mass spectrometry. A total of 675 one day old Japanese quail, were randomly distributed in 9 groups by three replicate (25 birds (7 male and 18 female) in each replicate). Treatments were included two levels (0.5 and 2%) of each herbal plants powder and a control group with diets free of plants medicine. The results showed that the eggs weight (g), week eggs production and feed conversion ratio were affected significantly ( $p < 0.05$ ) by different level of herbal plants. According to the results, use of these four herbal plants powder in Japanese quail ratio could improve egg sensory properties and biochemical factors.

**Keyword:** Herbal plants, Japanese quail, Biochemical factors

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### Effect of Rosehip Seed Oil Therapy on Neurodegeneration of Retina and Optic Nerve in Rats

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The rose hip (*Rosa canina* L.) seed oil contains polyunsaturated fatty acids that shown antioxidative and anti-inflammatory properties. Polyunsaturated fatty acids have been shown a potential in prevention of neurodegenerative disorders. Kainic acid (KA) and formaldehydes by different mechanisms initiate apoptosis and necrosis like situation observed in neurodegenerative disorders. This study evaluates the benefits of the oil pretreatment through intraocular application as well as intraperitoneal injection on KA and formalin induced retinal and hippocampal injuries in rats, respectively. The oil is extracted using hexane. Male rats were injected with hip rose oil (25 or 50  $\mu$ l/kg, i.p.) for 5 days 30 min before formalin (4 mg/kg, i.p., 5 days). The study of topical medications, rats treated with three drops of the oil (50 $\mu$ l) each day for four weeks and then KA (3 nmol) injected intravitreally to rats. The rat's hippocampal and retinal tissue samples were evaluated pathetically after Cresyl violet of H&E staining, respectively. Pretreatment with the oil (25 or 50  $\mu$ l/kg, i.p.) significantly ( $p < 0.01$ ) prevented from formalin induced retinal and hippocampal damages in comparison with untreated rats. Intraocular application of the oil (5 and 10  $\mu$ l) also can suppress KA induced retinal ganglion cells reduction significantly ( $p < 0.01$ ). Taken together, it suggests that either systemic or local application of rose hip oil could neuronal protective effect in different animal models of neurodegeneration.

**Keywords:** *Rosa Canina* L., Seed oil, Kainic acid, formalin, Ganglion cells





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## Evaluating the Effect of Oral Opium on Antioxidant Capacity and Hippocampus Histology in Hypercholesterolemic and Normal Golden Syrian Hamster

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Different studies have shown the effect of opium in pain relief and lowering blood sugar and cholesterol; however, opium can also increase oxidative stress. This study aims to evaluate the effect of oral opium on antioxidant capacity and hippocampus histology in hypercholesterolemic and normal golden Syrian hamster. This study was conducted using 32 male Golden Syrian hamsters weighing 90-110g. Animals were divided into four groups with different treatment regimes: 1- control group, non-addicted-hypercholesterolemic, 3- oral opium addicted-cholesterolemic, 4- oral opium addicted-hypercholesterolemic. Oral opium was dissolved in 1ml hot distilled water with which animals were fed twice a day with a dropper. Opium treatment started with the initial dose of 10 ml per day and reached up to 40 ml a day over a period of 8 days. Animals were fed with this dose up to the end of the 30<sup>th</sup> day. Statistical analysis of the data shows that lipid peroxidation increased significantly ( $P < 0.05$ ) in addicted and addicted-hypercholesterolemic groups. In other hand, as compared with normal group, the amount of TAC and thiol groups in addicted and addicted-hypercholesterolemic groups increased significantly ( $P < 0.05$ ). The results of hippocampus histology show that in hypercholesterolemic, addicted and addicted-hypercholesterolemic group, the number of neurons decreased and their structure was damaged. Although opium has analgesic effects, the results of this study confirm the harmful effect of opium on hippocampus under hypercholesterolemic conditions.

**Keywords:** Opium, Cholesterol, Lipid antioxidant, Hippocampus, Hamster

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## Local Effect of Artemisia Sieberi Extract on The Skin Wound Healing in Rat

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One of the most important issues that science medicine has been faced with the issue is the treatment of wounds. Variety of synthetic drugs has long been the more chemicals are introduced to accelerate the healing process and have been used, which unfortunately most of them have side effects are numerous. To determine the effect of Artemisia sieberi extract on topical skin wound healing in rat was conducted. In this experimental were study 60 male rats. The mice were randomly divided in to control and treatment groups were divided. Shear length and 2 cm thick dermis on the back of the animals under topical anesthesia was induced with Lidocaine. For the control group received no treatment, treatment groups, received Artemisia sieberi extract twice daily until the start of the experiment. Calculate the percentage of wound healing, wound length measured on days 2, 6, 10, 14, 18, 22 after cut wounds and pathological study of wound healing complete. Artemisia sieberi on the process and reduce shrinkage during wound healing and it has no positive effect and while this material could reduce the number of Neutrophils ( $p \leq 0/05$ ) and Increase the number of Eosinophils ( $P \leq 0/05$ ). Effect of Artemisia sieberi extract on the reduction inflammation and tissue repair time reduction compared to control was significant. This combination due to phenolic substances in their antibacterial properties and also the regulatory process is inflammation. Also reduced Neutrophils by reducing the severity of inflammation in the inflammatory phase is restored. Reduces the inflammatory phase is caused reduces wound healing time. Artemisia sieberi an effective role on quality alone is healing process. But reduce the length of the wound, the expected effect does not show us.

**Keywords:** Wound healing, Artemisia sieberi

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## Antibacterial Activity of *Thymus Daenensis* Essential Oil Against Six Foodborne Pathogens

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The essential oil of *Thymus daenensis* 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* against six foodborne pathogens (*Pseudomonas aeruginosa*, *Clostridium botulinum*, *Bacillus cereus*, *Staphylococcus aureus*, *Salmonella typhimurium* and *Yersinia enterocolitica*) by micro broth dilution assay [2]. 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. Antibacterial activity (on basis of Minimum Inhibitory Concentration (MIC) of the plant was studied by a micro broth dilution assay [1]. The *Thymus daenensis* essential oil exhibited complete inhibition against six foodborne pathogens, *Pseudomonas aeruginosa*, *Clostridium botulinum*, *Bacillus cereus*, *Staphylococcus aureus*, *Salmonella typhimurium* and *Yersinia enterocolitica* at 2000, 2000, 1500, 1250, 1500 and 1250 ppm, respectively, by micro broth dilution assay. In conclusion, the results presented here show that *Thymus daenensis* essential oil could be considered as a natural antimicrobial source.

**Keywords:** Foodborne pathogens, Antibacterial activity

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## Carvacrol Reduces Apoptosis Rate and Index of Oxidative Stress in the Heart's Hypertrophy in the Rat.

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Cardiac hypertrophy is an adaptive response of myocytes to pathologic stimuli such as hypertension. An increase in cardiomyocyte size and the alterations in cardiac gene expression to during hypertrophy may be compensatory manage the overload on the heart; in long time, This complication, by increased free radicals and apoptosis rate results in heart failure and ultimately death. Given the essential role of plant extracts as the natural antioxidant and protective agents, this study aimed to evaluate the effects of carvacrol on apoptosis rate and index of oxidative stress in the heart's hypertrophy in the rat. In this study, male Wistar rats (170-200g) were divided into following groups: rats subjected to hypertrophy without treatment (H), hypertrophied rats pretreated with different doses of carvacrol (25, 50 and 75 mg/kg/day, Car25+H, Car50+H and Car75+H groups respectively), rats received DMSO as a carvacrol solvent (DMSO+H), and intact animals which were elected as the control group (Ctl). Left ventricular hypertrophy was induced by abdominal aortic banding. Catalase gene expression was evaluated by real time polymerase chain reaction technique. Cardiomyocytes apoptosis was determined using TUNEL assay technique and fibrosis was assessed using Masson trichrome staining. Catalase activity, malon dealdehyd concentration and DPPH radical scavenging activity were measured according to biochemical protocol. In H group, apoptosis rate increased significantly compared to the Ctl group (P<0.001). While the apoptosis percentage was suppressed in the Car 50+H and Car75+H groups in comparison with H group (P<0.05 and P<0.01, respectively). There is no significant differences in catalase mRNA expression in H group. But catalase mRNA expression was increased in Car 50+H group compared to the H group (P< 0.05). In Car50+H and Car75+H groups, antioxidant activity of catalase was increased significantly compared to the H group in serum and cardiac tissue (P<0.001). Malon dealdehyd concentration and the DPPH radical scavenging activity were increased in group H compared to the Ctl group. But in the Car75+H group, the serum concentration of MDA was significantly decreased in comparison with H group (P<0.01) and DPPH radical scavenging activity was significantly increased in comparison H group (P<0.05). The result of our study showed that, Carvacrol can protect the heart against pressure overload-induced hypertrophy by anti-oxidant and anti-apoptotic effects.

**Keywords:** Hypertrophy, Oxidative stress, Carvacrol, Catalase, Apoptosis



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## Effect of Elicitation on Antioxidant Activity and Biomass Production in *Atropa Belladonna* Hairy Root Cultures

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*Atropa Belladonna* L. from Solanaceae, is one of the most important commercial sources of tropane alkaloids like atropine and scopolamine. These kinds of alkaloids are used as mydriatic, antispasmodic, anticholinergic, sedative and analgesics agents. Hairy root culture technology is an attractive alternative system for the uniform production of bioactive compounds, can continuously provide high-value medicines, foods, and healthy constituents, independent of geographical, climatic, or environmental variations and constraints. Hairy root cultures produced via *Agrobacterium rhizogenes*-mediated transformations have emerged as an ideal biotechnological system for the production of valuable phytochemicals because of their genetic stability and large-scale biomass production without phytohormones. In the present study, the effect of biotic elicitor (yeast extract) on the growth rate and antioxidant capacity in *A. Belladonna* hairy roots were studied. Hairy roots were derived from cotyledon explants inoculated with *A. rhizogenes* and elicited by yeast extract at different concentrations (0, 0.5, 1, and 1.5 mg L<sup>-1</sup>) for different exposure times (24 and 48h). The results show that the highest hairy root fresh and dry weight (3.17 and 0.29 g, respectively) were found in the medium supplemented with 0 mg L<sup>-1</sup> (control) yeast extract and the lowest fresh and dry weight (2.68 and 0.174 g, respectively) were found in the medium supplemented with 1 mg L<sup>-1</sup> at 24 hours of exposure time. In the case of antioxidant capacity, highest (12.54%) and lowest (8.12%) antioxidant activity were observed in 1.5 mg L<sup>-1</sup> at 48 hours of exposure time and 1 mg L<sup>-1</sup> at 24 hours of exposure time, respectively.

**Keywords:** Elicitor, Yeast extract, Antioxidant activity, Atropine, Hairy root

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## Effect of Different Concentrations of Dimethyl Sulfate on Purslane (*portulaca Oleracea* L.)

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In order to determine the appropriate dosage in dimethyl sulfate (DMS) to induce mutation on purslane (*portulaca Oleracea* L.), this research was conducted during 2016-17 at the research farm of Shahed University, College of Agriculture. The seeds were treated with DMS at concentrations of 0, 0.03, 0.05, 0.1, 0.2, 0.3, 0.4% for 5 hours at 20 °C. The seeds were washed 24 h in tap water. Germination test was carried out in a completely randomized design with 4 replications. After determining the appropriate concentration with probit analysis, seeds were again treated with DMS with 0, 0.06, 0.08, 0.1, 0.12, 0.14%. In addition to germination test, seeds cultured in the field to generate M2 seeds. The M2 seeds were cultivated in separate. The traits under study included plant height, stem diameter, number of branches, leaf area, leaf number, fresh and dry weight of stems and leaves. With probit analysis, an appropriate concentration of 0.09% was determined as the best concentration of DMS for inducing mutation. The results of variance analysis showed that there is a significant difference between different concentrations of DMS in germination rate at 1% probability level. The correlation between the studied traits in M<sub>2</sub> was statistically significant. In factor analysis, for the 11 characteristics studied, there were two factors that explained 87.8 percent of the data variation. In the first factor, traits such as total dry weight, stem dry weight, leaf dry weight, number of branches and plant height were evaluated as important traits.

**Keywords:** Germination, Probit analysis, Plant height, Factor analysis.



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## Biochemical Changes in Leaves of *Calendula officinalis* L. under the Influence of Bio Organic Fertilizers

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*Calendula* lends itself to both field-based and greenhouse floriculture as a model crop that is relatively easy to grow but with broad applicability as both an ornamental and medicinal plant. It has been reported to possess many pharmacological activities, which include antioxidant, anti-inflammatory, antibacterial, antifungal and antiviral [1]. A two-year field study was conducted to evaluate the effects of bio organic fertilizers on calendula cultivars. Co-inoculation of two plant growth promoting rhizobacteria, humic acid, vermicompost and combinations of these fertilizers on biochemical properties were evaluated in calendula. Based on the combined analysis of variance over years, the investigated parameters were significantly affected by fertilizers. Applied organics in combination with fixing bacteria and also vermicompost individually were more effective than the other treatments. The biosynthesis of leaf protein, soluble and insoluble carbohydrate contents were increased in leaves of treated plants. Bio organic fertilizers have a potential for maintaining and even improving quality and safety in medicinal plants production. The present results indicate that the selected organic and bio fertilizers promoted some biochemical parameters of calendula and consistent with saving natural resources and sustainable practices.

**Keywords:** Biofertilizer, Carbohydrates, Humic acid, Protein, Vermicompost

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## The Effects of Pre-chilling on Germination Traits in Different Populations of *Achillea tenuifolia* Lam.

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*Achillea* is a large genus belonging to the family Asteraceae with 115 species, that grow in temperate climates in dry or semi-dry habitat. It is native to Europe and Asia and can also be found in north of America. Nineteen species are found in Iran, herbal and perennial and often aromatic and medicinal. The medicinal plant is propagated through seeds. Seed germination is an important event in the life of every sexually reproduced higher plant. The seed of many medicinal plant species are dormant and do not germinate unless specific environmental signals or events occur. In order to comparison of seed germination traits of *A. tenuifolia* populations in gene bank of natural resources Iran, on control and pre-chilling condition, was performed research in during 2 years. Germination traits (Rate of germination, percent of germination, Length of Radical, Length of Plumule, Length of seedling, Vigor of seed, Ratio of Radical to Plumule) were measured on control and pre-chilling condition. The results of analyses of variance showed a significant differences among 26 populations of *A. tenuifolia* for all of germination traits ( $P < 1\%$ ). Mean of data obtained by Duncan's ( $p < 1\%$  &  $5\%$ ) for germination traits. The value of rate and percent of germination, length of radical, length of plumule and vigor of seed, show significant difference on control and pre-chilling condition, but this difference not significant in length of seedling and ratio of radical to plumule traits. Populations 25977 (Kordestan, Saqez), 22647 (Qom, Kasva), 22640 (Qom, Enjileh), and 10705 (Ilam, Ilam), 21687 (Semnan, Moalleman region) had the highest rate and percent of germination, on control and pre-chilling condition respectively, also populations 9900 (Kordestan, Divandareh) and 17006 (Kordestan, Saran), had the highest Length of Plumule and seedling on both of control and pre-chilling condition. The effects of chilling period on germination in many medicinal plants showed the highest germination percentage. Pre-Chilling treatment not significant effect on germination seeds of different populations of *Achillea tenuifolia*.

**Keywords:** *Achillea tenuifolia*, Germination traits, Pre-chilling

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## Karyological Data of *Tanacetum polycephalum* and *T. parthenium* (Asteraceae) Populations

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The genus *Tanacetum* (Asteraceae) is represented by 26 species in the flora of Iran, as herbal, perennial and sometimes shrub plants that dispersed in many regions of Iran, 12 of them are endemic [1]. These species have traditionally been used as a spicy additive for food. It has been used in folk medicine for reducing fever. In systematic, chromosome number is an important character for plant evolutionary studies and may provide some information about polyploidy and other highly significant genome or the benefits of plant chromosome number databases are a useful tool for systematic comparisons of geographical and taxonomical groups of plants. Chromosome numbers in 19 populations of *Tanacetum polycephalum* and *Tanacetum parthenium* from natural resources gene bank, were determined for the first time. The samples after pretreatment, fixation, hydrolysis and staining, the microscopic samples prepared by squash method. The best metaphases plates were selected and used to karyotype analyses. In all of populations the basic chromosome number was  $x=9$  and the populations showed two ploidy levels (diploid & tetraploid). Type of the most chromosomes in all of populations were metacentric (m) and sub-metacentric (sm) and located in 2A and 2B except for *T. parthenium* (Yazd, Taft) with  $5m+3sm+1st$  karyotype formula and 2C Stebbins classes. In addition, *T. polycephalum* (Esfahan, Golpayegan) with the highest value of AR and  $A_1$  had karyotype heterogeneity, also *T. polycephalum* (Esfahan, Golpayegan) and *T. polycephalum* (West-Azerbaijan, Uromeyeh) had the highest value of chromosome length (TL). Detailed karyotype allows us to group the different populations based on Stebbin's classes and asymmetry indices.

**Keywords:** Chromosome numbers, Ploidy levels, Karyotype, *Tanacetum polycephalum*

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## Essential Oil Components, Antioxidant Activity Study of *Phlomis olivieri* Bent. Collected From Hamadan

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The *Phlomis* genus (Lamiaceae) comprises more than 100 known species distributed mainly throughout Eurasia and North Africa. 17 species of this genus are endemic to Iran, which used as traditional treatments as mouth antiinflammator, analgesic, antiinfectio digestive, throat infection and culinary use. The composition of hydrodistilled essential oil from aerial parts of *Phlomis olivieri* Benth. (Lamiaceae), were analyzed by GC-MS. In the present study, the EOs yield of *Phlomis olivieri* Bent. 0.33% (v/w) based on dryweight. 34 constituents, representing 98.01% of the EOs of *Ph. olivieri* were identified. The main compounds were including Diisooctyl phthalate (41.53%), Caryophyllene oxide (18.17%), T-muurolol (10.62%) and Fitone (3.53%). The antioxidant activity of methanol extract was evaluated by 1, 1-diphenyl-2-picrylhydrazyl (DPPH) method. The radical scavenging activity were recorded 42.86 %.

**Keywords:** *Phlomis olivieri* Bent., Essential oils, Antioxidant activity, DPPH

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## Color and Form Function in Advertising Brochures and Its Impacts on the Commercial of the Medicinal Herbs and Their Products

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Color and form are two main elements in visual communication [1]. Color as a bridge between audiences and product, affects the psychological aspects of them. In making a brand these two elements are very efficient. Trade of medicinal herbs and products is based on the high quality, efficient effects and marketing. In Marketing, effective advertisements are very important. In order to provide efficient advertisements some factors should be considered: ads should have a theme to grab the attention [2]. Audience will actively contribute in the effective advertisement process. Emotional reaction is induced by effective ads and audience will search for more information from the specific product. In advertisement unusual pictures and creative titles are very effective [1,2]. Even a circulation in fonts or use of mirror image could draw attention. In order to illustrate the functions of graphic design of advertisement in medicinal plant trade, in present research, a field study was done to evaluate the medicinal plant brochures in Iran and to compare these with successful ones abroad. Considering the color and form of advertising posters revealed that despite successful samples in the world which mainly used white and different levels of green color, there are some unrelated and inappropriate mixtures of color in local samples. Some local companies used colors in their posters which are mainly used as toxic alert. Most of local companies ignored the importance of form modifications in their brochures while the form modification by cutting and also folding the cardboard can make pleasure variations in medicinal herbs brochures and increase the sale and consumptions.

**Keywords:** Advertisement, Medicinal herbs, Color, Form, Iran

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## Botanical and Chemical Characteristics of the Siah Gile Plant (*Vaccinium arctostaphylos*) and Presenting it as an Important Medicinal Plant in the Forests of Northern Iran

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The importance of medicinal plants and traditional medicine and recognition of its vital role in advancing regional, national and global aims for reaching to the health and vitality of societies, medicinal self-sufficiency, job creation, economic development, food security and conservation of genetic resources and active participation in world markets, is obvious for everyone. In this study, botanical and chemical characteristics of the Siah gile plant (*Vaccinium arctostaphylos*) and presenting it as an important medicinal plant, found in the forests of northern Iran, will be discussed. According to the results, heights of Gilan state, including Talesh mountains especially Chobar and Hoor countrysides, mountains of Asalem-Khalkhal and Heyran Mountain pass are the most important natural habitats of *Vaccinium arctostaphylos* in Iran. The results of study of polyphenolic compounds, anthocyanins and antioxidant properties of fruit and leaves of *Vaccinium arctostaphylos* showed that methanol extract of fruit and leaves of this plant, is full of phenolic compounds; therefore it can be used as a rich source of antioxidant in food and medical industries. Anthocyanins are strong antioxidants and have anti-diabetic, anti-obesity, anti-cancer and cardiovascular effects.

**Keywords:** Siah gile, Medicinal plant, Chemical characteristics

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## Formulation and Physicochemical Evaluation of *Citrus medica* Syrup as an Iranian Traditional Medicine

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*Citrus medica* (Citron) has been considered as a beneficial remedy for several ailments in Persian Traditional Medicine (PTM). Citron syrup has cold and dry temperament and is used as a tonic for stomach which can relieve headaches triggered by gastrointestinal complaints. In this study, Citron syrup has been formulated according to PTM manuscripts and physicochemical evaluations have been accomplished to present an appropriate formulation. The fresh fruits of Citron were peeled thoroughly and then Citron juice was extracted by a fruit juice extractor. The collected juice was passed through a strainer (mesh 100) to remove pulp and seeds. Then the equivalent weight of sugar was added to clear Citron juice and the mixture was heated to decrease the syrup volume to 60%. The physicochemical and microbiological quality of final product was evaluated according to standard protocols. The syrup was assessed in accelerated condition (40 °C) during 6 months. The effects of storage time and temperature on total soluble solids, pH, and reducing sugars were studied for syrup stability. The prepared formulation was a viscous and brown syrup with Citron flavour and fragrance. No precipitation were observed in the syrup. Acidity, pH and reducing sugars didn't have significant changes during six months ( $p > 0.05$ ). No microbial growth was observed in the formulation. In the accelerated stability tests, no remarkable changes were seen in the product. So the formulated *Citrus medica* syrup could be introduced for further mass production after completing the final required evaluations.



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## Isolation and Cloning of DNA of Salutaridinol 7-o-acetyltransferase (*SalAT*) Gene from *Papaver bracteatum*

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The Persian poppy called Kabir by the scientific name of *Papaver bracteatum* has been long propounded as a new source for production of Codeine Alkaloid as well as addiction cure medicines like Naloxone and Naltrexone. This plant species is an Iranian indigenous, containing no morphine and is fully rich of Thebaine. By having these valuable practical capacities, it can be a proper substitute for *Papaver somniferum* which its plantation practice is currently forbidden according to the prevailing rules and regulations in Iran. Considering the fact that manipulation of biosynthesis pathways of plant cell and each of the metabolites serve as a valuable capacity of genetic engineering discipline, the issue of extraction of effective genes in the biosynthesis pathways of Thebaine with the aim of enhancing the process of engineering of Persian poppy metabolites as well as specific alkaloids has gained a position as greatly important. In this research, the Acetyltransferase (*SalAT*) Salutaridinol 7-O- gene of Persian poppy origin which is considered as one of the key genes in the pathway of Thebaine biosynthesis, has been extracted using polymerase chain reaction and specific gene primers from Persian poppy genome and eventually being cloned in the pBI121 plasmid expression vector. The recombinant plasmid has been proved by PCR and enzymatic digestion. Reaching to the recombinant expression structure containing *SalAT* gene can be considered as an initial and functional step in the pathway of metabolic engineering of this valuable medicinal material.

**Keywords:** *Papaver bracteatum*, Thebaine biosynthetic pathway, *SalAT* gene

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## Antibacterial and Mechanical Properties of Wound Dressing Including Chitosan with *Plantago Major L.*

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From the beginning of the creation, man has always been exposed to phenomena leading to wound, hence one of the most important issues that medical science has been ever faced, it is wound healing problem with the goal of healing in the shortest possible time and the least side effects. Medicinal plants are used, because have a fewer side effects, availability and cheapness to treat many diseases with the cause of infection and poisoning [1,2]. The purpose of this research was to investigate the strengthening and antibacterial properties of *Plantago Major L* extracts and powders loaded on the chitosan for the synthesis of wound dressing. For this purpose, the effect of ethanolic (70%) extract and powders of *P. Major L* leaf loaded on the chitosan was investigated. Concentration of 10%, 20% and 40% of ethanolic extract of *P. Major L* leaf and 0.4 g of leaf powder with the control sample (pure chitosan) were prepared. The results of the experiments showed that the extract of *P. Major L* had been an antimicrobial properties and the zone (growth) inhibition of Gram-positive bacteria (*Staphylococcus aureus*) and Gram-negative (*Escherichia coli*) in the presence of 40% of the extract on the matrix of chitosan is more than sample of pure chitosan film, and chitosan polymer containing 40% of the extract of *P. Major L* leaf has been show a more favorable antimicrobial effect. Also, the presence leaf extract with concentration of 40% has increased the tensile strength, elongation, water absorption and swelling of chitosan film, but the plant powder showed a decrease in the strength and elongation of the chitosan film.

**Keywords:** Wound, *Plantago Major L.*, Antibacterial properties, Mechanical strength

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## To Compare Effect of Hydrocolloid Dressing and 1% Silver Sulfadiazine Dressing on Burn Status Wounds in Patients with Second –Degree Burn

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The present study is a Quasi-experimental study which has been done in department of Emergency, Imam Khomeini hospital, Hamedan. The aim is to study the effects of hydrocolloid dressing as compared to 1% silver sulfadiazine in healing process of the second degree burns. In this study we selected 30 patients every one was two burn lesions, one lesion a test group (with tragacanth gel dressing) and the second lesion ad control group (with 1% silver sulfadiazine dressing). The instruments were check list to determine the percentage of burn area, healing and check list to elaborate degree of pain. We completed for each dressing session. To analysis the data we used pair T-test and k-square and fisher test. According to results, duration of healing the wound in test group was 8.06 days and in control group it was 13.2 days, Using pair Ttest there was a significant difference between two group ( $P=0.000$ ) that indicates shorter periods of healing in second stage burns of test groups compared to control group also indicates meaning number the mild degree of pain (1.97) in test group as compared to moderate degree of pain (4.64) in control group, using pair T-test there was significant difference between two groups ( $P=0.000$ ) that indicates test severe pain test group as compared to control group. One important finding was the score of wound healing was a significant statistical difference between two groups ( $P=0.000$ ). Additionally for all criteria of burn healing there was a significant difference  $P<0.05$  between two groups that indicates better healing process & second degree burns in test group compares to control group. it is suggested applying hydrocolloid dressing for second degree burns.

**Keywords:** Hydrocolloid dressing, Tragacanth gel, SilverSulfadiazine, Burn wound healing

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## Effect of Ascorbic Acid and Spermine on Morphological Traits and Photosynthetic and Flavonoids Pigments of Damask Rose (*Rosa damascena* Mill.) in Zanjan Climate

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In order to evaluate the effect of Ascorbic acid and Spermine on some morphological and physiological characteristics of Damask rose plant, a completely randomized design was conducted in three replications in Zanjan province. Treatments included three levels of Ascorbic acid (5, 10, 20 mM) and three Spermine levels (0.5, 1, 1.5 mM). The evaluated traits included morphological traits (plant height, number of flowering branches and plant diameter) and pigments (total chlorophyll, chlorophyll a, chlorophyll b, carotenoids, leaf flavonoids and petals flavonoids). The results showed that plant height, chlorophyll a, b, total and carotenoids were significant at 0.05 and leaf and petal flavonoids at 0.01 compared to the control. Based on the results of this study, the concentration of 20 mM Ascorbic acid in different concentrations of this material had the highest effect on plant height, chlorophyll b and leaf carotenoids, concentration of 10 mM, had the most effect on petal flavonoids and also the concentration of 5 mM of this material had the greatest effect on leaf flavonoids. In addition, the concentration of 1 mM of Spermine among the various concentrations of this substance had the greatest effect on chlorophyll a and total chlorophyll content as well as the concentration of 1.5 mM of the same substance on the number of flowering branches. In another experiment, the effect of Spermine was investigated on a number of morphological traits (number of flowers, number of buds, average number of flowers per branch, average number of buds per branch, petal dry weight). The results showed that all traits were significant at 0.05 compared to the control and the concentration of 1.5 mM of Spermine showed the best results.

**Keywords:** Carotenoids, Chlorophyll, Vitamin C, Polyamine, Yield



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## *In vitro* Propagation of *Dracocephalum kotschy* Species: An Endangered Medicinal Plant

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*Dracocephalum kotschy* is a perennial medicinal plant belongs to lamiaceae family. This species exposed to extinction because of mass exploitation by human being and poor acclimatization of this plant at field condition. This plant contains essential oil and various flavonoid and phenol compounds that is valuable in pharmacology, cosmetic and food industry. In folk medicine, *D. kotschy* used as painkiller, rheumatoid diseases and kidney disorder. According to literature, antihyperlipidemic, antispasmodic and analgesic properties and immunoinhibitory effect [1] of this species were proven. In this study, an efficient micropropagation protocol of *Dracocephalum kotschy* through seed explant were developed. The nodal explants were harvested from *in vitro* raised seedling and was cultured on MS medium containing half strength of nitrate concentration supplemented with different concentration of BAP (benzylaminopurin) and NAA (Naphthaleneacetic acid) and sub cultured every four weeks. [3]. Rooting was done in medium without growth regulator or supplemented with IBA or NAA. The acclimatization process was done under greenhouse condition. The pot containing sand/soil/manure (2:1:1) was used and irrigated daily. The best result in relation to multiplication rate (Number of shoot per explant) and shoot length was obtained in medium containing 0.1 mgL<sup>-1</sup> BAP and 0.01 mgL<sup>-1</sup> NAA. Rooting percentage varied between 22% to 78% and maximum rooting (78%) was obtain in medium containing 0.5 mg/L<sup>-1</sup> NAA. All plantlets were successfully acclimatized under greenhouse condition.

**Keywords:** Micropropagation, Plant growth regulators (PGR), *Dracocephalum kotschy*

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## Fumigant Toxicity of Essential Oils *Cinnamomum verum* (Lauraceae) and *Cuminum cyminum* (Apiaceae) Against Red Flour Beetle (*Tribolium castaneum*)

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In the present study, the essential oil from *Cinnamomum verum* (Lauraceae) and *Cuminum cyminum* (Apiaceae) was isolated and its insecticidal activities were determined against *Tribolium castaneum*. Essential oils were isolated by hydrodistillation method using Clevenger apparatus. Experiment was carried out at 27 ± 2 °C and 60 ± 5% R. H. under dark condition adopting a complete randomized block design. For each essential oil, four concentrations with six replications were tested. These essential oils caused death of first instar larvae and adults of *T. castaneum* when fumigated. The maximum concentration of essential oils (0.56 µl/cm<sup>3</sup>) of *C. cyminum* and *C. verum* caused, 100% and 96.2% mortality of first instar larvae and 95% and 91% mortality of adults, respectively. LC<sub>50</sub> values were calculated using probit MsChart software by recording the mortality at 24 h. The LC(50) values against the adults of the insect were 0.044 and 0.040 µl/cm<sup>3</sup> and against first instar larvae were 0.058 and 0.045 µl/cm<sup>3</sup> for *C. verum* and *C. cyminum* oils respectively. All the responses were found concentration-dependent. The toxic and developmental inhibitory effects may be due to suffocation and inhibition of various biosynthetic processes of the insects at different developmental stages [1,2].

**Keywords:** Plant essential oils, *Tribolium castaneum*, Fumigant, Bioactivity

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## Aromatherapy in Nursing and Midwifery, Some Case Reports

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Aromatherapy can create a state of calmness and help to alleviate anxiety. We have evaluated the effect of the method in some problems in nursing and midwifery. The effect of chamomile essential oil on reducing anxiety in nulliparous women during the first stage of childbirth was investigated. The findings of this study showed that chamomile oil reduces the anxiety level during childbirth. An effect of inhalation of lavender oil on open-heart surgery pain was studied, too. In the study there is no significant difference between 2 groups (aroma and placebo) and the result of study proves that lavender oil inhalation has no effect on reducing the pain of open-heart surgery. Therefore, the aromatherapy could effectively reduce blood pressure and heart rate in patients and can be used as an independent nursing intervention in stabilizing mentioned vital signs. Aromatherapy with *Citrus aurantium* oil on anxiety during the first stage of labor was studied. However, the levels of anxiety at dilations of 3-4 and 6-8 cm were significantly lower in the aromatherapy group compared with the control group. The results of this study confirmed aromatherapy with *C. aurantium* blossom oil as a simple, inexpensive, noninvasive, and effective intervention to reduce anxiety during labor. Also, inhalation effect of peppermint aroma on nausea and vomiting after abdominal surgery in patients was investigated. There was not statistical difference between two groups in terms of confounding variables such as body mass index, length of anesthesia as well as type of anesthesia. 6.7% of patients in peppermint group and 0% of patients in control group experienced mild nausea. The results indicated there was significant difference between the two groups in the severity of nausea in surgical ward. The findings of the study showed no difference between peppermint and saline in terms of prevention of nausea and vomiting.

**Keywords:** Aromatherapy, Lavender, Chamomile, Peppermint, *Citrus aurantium*

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## Antioxidant Activity of *Tanacetum Parthenium* in Different Growth Stage

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Today we know well that radicals cause molecular transformations and gene mutations in many types of organisms. Antioxidants are main factors for neutralizing the free radicals which are active and harmful materials. Antioxidants, which can inhibit or delay the oxidation of an oxidizable substrate in a chain reaction, therefore, appear to be very important in the prevention of many diseases. The number of antioxidant compounds synthesized by plants as secondary products. Feverfew (*Tanacetum parthenium*) is a perennial plant which is herbaceous in habit. This plant is native to Kazakhstan, Central Asia and Mediterranean region and has a wide distribution in Europe, Asia and America. The methanolic extracts of feverfew at different growth stage were analyzed for total antioxidant activity by 2, 2-diphenyl-1-picrylhydrazyl (DPPH). In our research, methanolic extract of dried aerial parts in different growth stage samples with six concentrations in triplicate (n=3) was prepared. The data were statistically analyzed by SPSS software using ANOVA (P<0.01). The antioxidant activity order to 96.81, 70.63 µg/mL, in vegetative and flowering stage respectively (by DPPH). In conclusion, the antioxidant activity of methanolic extract of feverfew at flowering stage was significantly higher than that of methanolic extract of feverfew at vegetative stage (p<0.01), which was due to difference in their phenolic content. A high correlation was found between the antioxidant activity and total phenolic content.

**Keyword:** DPPH, Feverfew, Antioxidant compounds, flowering stage

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## Comparison of Chemical Constituents of Total Phenol, Flavonoid, Flavenon and Antioxidant Activity of Methanolic Extracts the *Tanacetum Parthenium*

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Aromatic plants represent a renewable source of flavoring substances which can be used in food, perfumery and pharmaceutical industries. Two important factors in secondary metabolite production in herbs are plant genetic and environment. Production of secondary metabolites may help plants to adjust themselves against different kind of stresses [1]. Feverfew (*Tanacetum parthenium*) is a perennial plant from Asteraceae which is herbaceous in habit. This plant is native to Kazakhstan, Central Asia and Mediterranean region and has a wide distribution in Europe, Asia and America. Feverfew has been reported to contain many sesquiterpene lactones as major secondary metabolites, of which parthenolide is considered the major active component of the plant. Methanolic extracts of feverfew were investigated for their antioxidant activity by DPPH assay, total phenol, flavenoid and flavenon. antioxidant activity for methanolic extract 96.82 µg/ml (by DPPH), total phenol and flaenoid and flavenon were 54.17, 291.02 and 62.01 a high correlation was found between the antioxidant activity and total phenolic, flavenon and flavenoid content.

**Keyword:** Feverfew, Flavenoid, Phenol, Antioxidant activity

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## Effect of Drying Temperature on Colour Parameters and Secondary Metabolites Content in Saffron

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Drying of stigma is the most important post-harvest process in saffron production. Traditionally, the stigma is dried at ambient temperature which increases the drying time and also increases the probability of contamination of the product. Recently, other dehydration methods such as microwave and electrical oven are used to dry the stigma. However, the usefulness of these methods should be tested. For this purpose an experiment was performed on different drying methods of stigma and corolla: 1- in the shade condition with room temperature (~ 25 °C) as traditional method, 2- in the oven at 55 °C and 3- in the oven at 75 °C. Flowers were collected from the saffron field of Saffron Research Group, University of Birjand, in autumn, 2017. After separating and drying the stigma, the color indices and the main ingredients in them (crocin and safranal) were determined in laboratory. Colour of dried stigma was evaluated using a colorimeter and the results were expressed as Hunter color values (L\*, a\* and b\*). L is the brightness ranging from 0 (black) to 100 (white). The value a\* is the redness ranging from negative values for green to positive values for red. The value b\* is the yellowness ranging from negative values for blue and positive values for yellow. Colour intensity (chroma) and hue angle also were calculated using related equations and crocin and safranal were measured based on national standard No. 259-2. In addition, the content of anthocyanin in dried corolla was determined. Effect of drying method was significant on almost all measured indices in stigma. There was no significant difference between two oven drying treatments in terms of colour parameters. However, oven drying in both temperatures improved L\*, b\*, chroma and hue angle compared with traditional method. Crocin content was highest when the stigmas were dried at 55 °C. The amount of this compound at temperatures of 50 °C and 75 °C was, respectively, 34 and 18% higher than that of the stigma dried at ambient temperature. Similar trend was observed about safranal, when its content (absorption of 1% aqueous solution in 330 nm) in ambient, 55 and 75 °C was 18.6, 26.5 and 24.2, respectively. Anthocyanin content of corolla in traditional method was 45 and 55% higher than 55 and 75 °C, respectively. Totally, similar to some other research stigma drying in oven with temperature of 55 °C was the best treatment.

**Keywords:** Anthocyanin, Crocin, Hunter color values, Safranal, Stigma

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## Effects of Different Drying Methods on Polyphenols Constituents of Red Grapevine Leaves

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Grapevine is well known as a potential source of high value phytochemicals. Traditionally, red grapevine (*Vitis vinifera* L.) leaves has been used to treat varicose veins. Recently, it has been proven that flavonoid compounds in the red grapevine leaves are the most responsible ingredient to relieve symptoms of Chronic Venous Insufficiency (leg pain, edema, varicose veins). Due to the importance of these metabolites, it seems necessary to investigate the effects of postharvest conditions on quality and quantity of the therapeutic metabolites of red grapevine leaves. In this study, influence of six different drying conditions (sun, shade, oven 45, 50, 55 and 60 °C) on total phenols, total flavonoids and quercetin  $\beta$ -D glucuronide content of red grapevine leaves have been investigated. The highest amount of total flavonoids (196 mg/g dry weight) was under shade, while, the highest amount of total phenols (52 mg/g dry weight) was observed under sun drying conditions, respectively. HPLC analysis showed that the maximum of quercetin  $\beta$ -D glucuronide content was obtained under shade and oven 60°C conditions with amount of 7.16 (mg/g dry weight) and 7.81 (mg/g dry weight), respectively.

**Keywords:** Polyphenols, *Vitis vinifera*, Chronic venous insufficiency

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## Effect of Salinity Stress on Growth and Essential Oil Composition in Feverfew

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Feverfew (*Tanacetum parthenium* L.) is one of the most prominent medicinal species in the Asteraceae family, native to Kazakhstan, Central Asia and the Mediterranean region, with a wide distribution in Europe, Asia and America [2]. essential oils (EOs) are produced by various differentiated structures, especially the number and characteristics of which are highly variable. EOs are localized in the cytoplasm of certain plant cell secretions, which lies in one or more organs of the plant; namely, the secretory hair or trichome, epidermal cells, internal secretory cells, and the secretory pockets. These oils are complex mixtures that may contain over 300 different compounds [5]. When Plant exposed to high salt concentration all the major processes are affected [4]. It causes a decline in primary metabolites which results a shortage of precursors necessitated for the synthesis of secondary compounds. salinity stress decreases herbal yield in various medicinal plants [1]. This research aims to investigate changes EO Composition under salinity stress. This feverfew plant was cultivated by the use hydroponic method. Salinity was induced by NaCl and CaCl<sub>2</sub> (2:1) at 0, 60, 120, 180 and 240 mM levels. The results indicated that salinity stress causes a decrease in the fresh weight and dry weight, but it increased the amount EO yield. That according to the GC-MS results in TP plant normal conditions or non stress (0 mM salinity and 0 ppm SA treatment), 44 compounds were identified that comprised 98.0912% of the feverfew EO. the main components such as camphor (49.12%), trans-chrysanthenyl-acetate (21.749%), camphene (8.755%) and p-cymine (4.30 1%) and other EO components that salinity stress changed these components.

**Keywords:** Camphor, GC-MS, Camphene, Feverfew, Essence

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## ***In vitro* Production of Thymol and Carvacrol in Two Different Species of *Thyme* Including: *Thymus kotschyanus*. and *Thymus vulgaris* L.**

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Medicinal plants has been recognized with elite ability in production of naturally products as secondary metabolites with antioxidant, pharmacological and industrial properties. The genus *Thymus* L., is commonly used as flavoring agents in food products, drinks, perfumeries and pharmaceuticals properties. The thyme species, have many medical properties such as antioxidant, antispasmodic, anti-cancer, anti-mutagenic, anti-inflammatory, antibacterial, and anti-fungal activities, which is derived from two important phenolic derivatives called thymol and carvacrol found in leaves and flowering parts. *In vitro* callus cultures could be used an attractive and alternative method for sufficient extraction of secondary metabolites within reasonable time and cost. The present study investigated the production of two important chemical compounds (thymol and carvacrol) by callus culture. After seed emergence, leaf segments were transferred to Murashige and Skoog (MS) medium supplemented with (2) mgL<sup>-1</sup> 2, 4-dichlorophenoxy acetic acid and (1) mgL<sup>-1</sup> Kinetin. The petri dishes were incubated in a growth chamber at 24 °C with photoperiod of 16/8 (light/dark). The methanolic extract of the calli were extracted after 2 months of callus induction and the chemicals were analyzed by High-performance liquid chromatography (HPLC). Chemical analysis showed different concentration of thymol (7.39 mg/l), (9.64 mg/l) mgL<sup>-1</sup> and carvacrol (0.26 mg/l) and (0.10 mg/l) in *T. kotschyanus* and *T. vulgaris* respectively. This novel finding showed that *in vitro* production of thymol and carvacrol by callus culture could be optimized for a wide industrial and pharmaceutical applications. And in terms of accumulation of thymol, *T. vulgaris* and carvacrol, *T. kotschyanus* are richer than the others.

**Keywords:** Callus culture, *T. Kotschyanus*, *T. vulgaris*; Thymol, Carvacrol

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## **Identification of Chemical Components and Different Fatty Acids in *Chrozophora tinctoria***

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Medicinal plants are known for their importance in the treatment of different diseases. *Chrozophora tinctoria* is an annual plant belonging to *Chrozophora* genus. This plant is well known across Europe, Africa, and Asia. The present study investigated the chemical compounds of seed and leaf methanolic extract of *Chrozophora tinctoria* by GC-Mass analysis. For this purpose, the petri dishes containing sterilized seeds were incubated in a growth chamber at 24°C with photoperiod of 16/8 (light/dark). The methanolic extract of the leaves were extracted after 7 days of seedling growth. The chemicals were analyzed by gas chromatography-mass spectrometry (GC-MS). GC/MS analysis showed 19 different compound including different bioactive compounds which 9, 12-Octadecadienoic acid was the most (42.15%), while dimethyl ketene (0.44%) was the least. In seed GC-Mass analysis by Head space analysis, 9 different fatty acid including saturated and unsaturated was found, which highest value (86.59%) and the least (0.01%) was denoted to linoleic acid and lauric acid (0.01%), respectively. This novel finding about chemical composition and fatty acids of *Chrozophora tinctoria* showed that the unsaturated fatty acids in the seeds of it could be introduced in human oil industry which is very beneficiary for oil and human nutrition.

**Keyword:** *Chrozophora tinctoria*, Medicinal, Fatty acid, GC-Mass

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## Effects of Anti-Bacteria and Anti-Fungal of Essential Oils Medicinal Plants Extracts *Satureja khuzestanica* on Control the Fungal Fusarium Wilt Disease Epidemics (*Fusarium Oxysporum* F.Sp. *Lycopersici*) in Tomatoes.

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Today in reason use irregular of chemical insecticides for controlling this plant diseases is increase resistance fungals in fungicide current and up costs those use and existence is natural compound anti-fungal alone effect fungicide, be attention to Effects of via scholars shows anti-bacteria and anti-fungal of essential oils and plants extracts and endeavor to point decrease consumption discover lead chemical insecticides. In this project In order to effects anti-fungal essential oils and *Satureja khuzestanica* extracts with concentration three (200, 400 and 600 ppm) comparing to Benomyl on accession Fungal Fusarium wilt on tomatoes in conditions diseases Ilam JEHAD agricultur laboratory are considered on 2014-2015. compietion this test on method . This test is using different concentration disorders with PDA cultivation. The results revealed that percent deterrence on concentration 200ppm essential oils more in to *Satureja khuzestanica* extracts, to concentration 400 and 600 ppm essential oils and plants extracts most deterrence percent for fungal Fusarium growth and equal by Benomyl fungicides and in to revealed that in to significantly in control. and sweat on fungal growth. this research shows that using botanicals is more appropriate replacement for chemical Fungicides.

**Keywords:** Fusarium, Fungicide benomyl, Botanicals, *Satureja khuzestanica*

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## Genetic Diversity of Medicinal Herb, *Fallopia convolvulus* (Polygonaceae)

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*Fallopia convolvulus* L. A. Löve is an annual herb from Polygonaceae with widespread distribution in Northern hemisphere. This taxon with erect, scandent and sometimes procumbent stems frequently grows in damp areas, roadsides and shady sites. Previous phytochemical studies on crude extract of *F. convolvulus* showed anticancer properties which was in relation to phenolic and flavonoid contents. As growing in different habitats can cause genetic differences due to local adaptation, in this study we use ISSR markers to study the genetic variability within and among populations of *F. convolvulus* in Iran. Eighty five plants from 11 populations were randomly collected from different habitats. Genomic DNA were extracted using CTAB protcole. PCR amplification was performed in a 25 $\mu$ L reaction mixture by a Thermal Cycler. PCR product was examined by electrophoresis in a 1% (w/v) agarose gel. Fragments were visualized by staining with GelRed. Data analyses were done by PopGene ver. 1.32, PAST ver. 2.17 and STRUCTURE softwares. Our results showed that 71% of genetic diversity was due to within populations. Mantel test showed a significant correlation between genetic and geographic distances. Limited amount of gene flow was determined between populations studied. Moreover, STRUCTURE results showed within population genetic differentiation supporting AMOVA result. We concluded that local adaptation, low gene exchange and genetic drift can affect genetic diversity of *F. convolvulus*.

**Keywords:** *Fallopia convolvulus*, Genetic diversity, ISSR

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## Growth Inhibition and Cell Cycle Arrest Effects of a Natural Flavonoid, Calycopterin, in a Breast Cancer Cellular Model.

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Herbs and plants have been used for medicinal purposes for many years. Recently, application of natural products with anti-cancer properties have received great attention. These agents kill the cancerous cell with the minimal side effect on normal cells. It has been demonstrated that flavonoids include immune-stimulant and *in vitro* cytotoxic activity. Calycopterin, 5, 40 - dihydroxy-3,6,7,8-tetramethoxyflavone is a major flavonol from *Dracocephalum kotschyi* used in Iranian traditional medicine. Research showed that Calycopterin contained anti-proliferative, neuroprotective and antiangiogenic effects in different cells. Here, calycopterin effects on proliferation, cell cycle arrest and migration is under investigation. MDA-MD-231 and MCF7 breast cancer cells were cultured in RPMI1640 medium with 10% fetal bovine serum. The cells were treated with various concentrations ( $\mu\text{M}$ ) of calycopterin for periods of 24 to 72 hours. MTT assay was done to calculate the IC50 dose of the drug. Morphological changes of the cells and their nucleus were assessed microscopically. The cells migration ability was studied with wound healing assay. Finally, the mechanism of action for the growth inhibitory activity was evaluated with flowcytometry for cell cycle distribution. Calycopterin reduced breast cancer cells viability in a time and dose-dependent manner while numerous shrinkage cells were detached from substrate. DNA fragmentation and chromatin condensation were seen microscopically. In addition in the presence of calycopterin the cells migration was restrained significantly and a high sub-G1 DNA peak was seen in flowcytometry analysis. The present results show calycopterin might inhibit breast cancer cell growth with the outstanding morphological and nuclear changes. The treated cells possessed high sub-G1 content that explain the relation of growth inhibition with cell cycle arrest. Therefore, calycopterin as a flavonoid includes anti-proliferative potential for breast cancer cells and a possible explanation for these case might be induction of apoptosis.

**Keywords:** Breast cancer cell, Calycopterin, Cell cycle, Flavonoids

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## Evaluation of *Nigella sativa* Genotypes for Salinity Tolerance

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The black cumin (*Nigella sativa* L.) is an herbaceous annual plant from Ranunculaceae family with vast applications in the food, pharmaceutical and cosmetic industries. Evaluation of tolerance of black cumin genotypes to salinity stress is important for selection of the best tolerant genotypes. In this regard, a greenhouse experiment was conducted to evaluate ten black cumin genotypes for salinity stress tolerance at different levels (0, 2.5, 5 and 7.5 dS/m) as a factorial experiment based on completely randomized design with three replications in Ardabil region. Salinity stress was made with sodium chloride solution at the mentioned concentrations, in the 3-4 leaf growth stage. The results showed that the highest reduction in the measured traits under 7.5 dS/m salinity was related to grain yield per plant (66.4%), root and shoot dry weight (56.3%) and grain weight per follicle (51.6%). However, flowering time and oil content were significantly increased as increasing salt levels. Among genotypes, the Kazemin genotype was the most tolerant in terms of grain weight per follicle, number of seeds per follicle, seed yield per plant and harvest index under salinity stress conditions and the Shahreza genotype was more sensitive among studied genotypes. Analysis of salt tolerance indices showed that genotypes of Kazemin and Mashhad 2 were the most tolerant genotypes in all three levels of salinity stress in terms of STI, GMP, MP and YI indices, and the Khomeini-Shahr and Shahreza genotypes were susceptible ones. The cluster analysis of genotypes in non-stress conditions (control) showed that Shabestar, Tabriz, Mashhad, Mashhad-2 and Kazemin genotypes located in first cluster and had better seed yield per plant than biological yield. Under salt stress conditions all the genotypes clustered in three groups in which Shabestar, Tabriz, Mashhad, Mashhad-2 and Kazemin genotypes as the first cluster had the highest seed yield and were tolerant genotypes, also the Shahreza genotype in the third cluster showed the lowest yield and was susceptible one.

**Keywords:** Black cumin, Cluster analysis, Salinity stress, Tolerance index

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## Effect of Chitosan on Crocin and Safranal Content and Expression of Controlling Genes in Suspension Culture of *Crocus sativus*

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Saffron (*Crocus sativus* L.) is rich in flavor, aroma and color, with its nutritional and medicinal properties. The aim of this study was to evaluate the effect of chitosan on crocin and safranal content and expression of their controlling genes in suspension culture of saffron. For this purpose, saffron bulbs were cultured in 1/2 MS medium supplemented with 0.1 mg l<sup>-1</sup> of 2-4-D and 0.5 mg l<sup>-1</sup> of BAP and cultured at 21 ° C. After 14 days, calli were induced. They were subcultured four times and then were grown in cell suspension culture. The cell suspension cultures were treated with 100 and 150 mg l<sup>-1</sup> of chitosan as elicitor at optimal growth conditions. Samples were taken at 24 and 72 hours after application of treatment in three replications. Measurement of secondary metabolites is done with HPLC and analysis of genes' expression was performed using real time PCR technique. The results showed that by using 100 and 150 mg l<sup>-1</sup> of chitosan after 24 and 72 hours, the expression of *CsLYC* and *CsGT-2* genes were significantly increased, but, the expression of the *CsBCH* gene was not affected. Also, the highest amount of crocin and safranal were observed 72 hours after application of 150 mg l<sup>-1</sup> of chitosan. Chitosan as an abiotic elicitor was found to enhance the gene expression and increasing the contents of crocin and safranal in suspension culture of saffron.

**Keywords:** Chitosan, Crocin, HPLC, Real time PCR, Saffron (*Crocus sativus*), Safranal

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## Composition of the Volatile Oil of Cultivated *Achillea tenuifolia* Lam. (Origin: Kordestan/ Iran)

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*Achillea tenuifolia* Lam. from Asteraceae family is an important medicinal and aromatic plant in Iran, which have considerable secondary metabolites, especially essential oil. The aerial parts of different *Achillea* species are widely used in folk medicine because of numerous pharmacological properties, like antioxidant, antispasmodic, antibacterial and anti- inflammation. In this study, the seeds of *Achillea tenuifolia* Lam. that was collected from Kordestan province (West Iran) were cultivated in the field of Alborz Research Station, Karaj, Iran. In order to compare of essential oil content and composition, flowering shoots and individual plant parts include flowers, leaves and stems were collected in full flowering stage. Composition of the volatile oils of different parts of *Achillea tenuifolia* Lam. was investigated by GC and GC/MS. The range of essential oil yield of different plant parts was %0.3 to %1.2. Twenty seven components were characterized that germacrene D was the major compound in all parts of plants. Also, phytol, methyl hexadecanoate and 14-hydroxy- $\alpha$ -muurolene were the main compounds of flowering shoots and stems. In addition to germacrene D, compounds such as camphor (6.8%) and 1,8-cineole (6.7%) in flowers oil and viridiflorol (6.5%) in leaf oil were the other main components.

**Keywords:** *Achillea tenuifolia* Lam, Essential oil, Germacrene D, 1,8 -cineole



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## Introduction and Identification of Medicinal Plants of West of Sarvestan Region in Fars Province.

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Plants are basic organisms in food chain. They have been the center of attention to man since the beginning of history. Dependence of man to the plants had persuaded him to identify useful and harmful plants. Nowadays, there is an interest for research on medicinal plants in the world and also in our country because of that many people prefer them to the chemical drugs. Today, medicinal plants have found a special position in the pharmaceutical research in the world. The medical community pharmacists and specialists have increased the use of medicinal plants and its products because of disadvantages and side effects of chemical drugs. Climate variation in Iran has been caused variation in vegetation. Collection and identification of medicinal plants will help progress in non-chemical. In this research, the vegetation of west of Sarvestan was investigated. Sampling was done from 9 locations. The plants were collected by survey and field work method, and all the necessary information were recorded in a notebook. Afterwards, all of the selected plants were pressed over the standard cardboard. By the help of key characteristics, the families of plants were recognized and by the help of other characteristics their genus and species were identified. In this study Latin and Persian references were used. Totally 37 species of medicinal plants were identified which classified in 18 families. The most prevalent species were belong to Asteraceae, Lamiaceae and Brassicaceae families. Some species such as *astragalus* sp., *Lepidium* sp. and *Plantago* sp. were the most frequent medicinal plants in the region. Dicotyledonous plants were the dominant species. However, native people prefer using medicinal species such as *Achillea eriophora*, *Descurainia Sophia*, *Cichorium intybus*, *Anthemis*, *Fumaria officinalis*, and *Plantago lanceolata* more than other medicinal plant species.

**Keywords:** Fars province medicinal plants, Sarvestan

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## Determination of Inulin Content in Chicory Root

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Inulin is a non-digestible oligosaccharide. It can preferentially stimulate the growth and activity of one or a limited number of desired bacteria in the colon, and thus improves host health. And more, it has positive effects on blood glucose attenuation, lipid homeostasis, mineral bioavailability and immunomodulation effects, Inulin is widely used in functional foods throughout the world for its health-promoting and technological properties. *Cichorium intybus* (chicory) is the major crop used for the industrial production of inulin. According to Iran pharmacopoeia the root of chicory contains up to 58% of inulin. Inulin represents a mixture of polysaccharide molecules with the general formula  $GF_{n-1}$ , where G is glucose, F is fructosyl ( $C_6H_{11}O_5-$ ), and  $n$  is degree of polymerization. Inulin has a degree of polymerization (DP) in the range of 2–60, so there is no suitable standard for inulin. Determination of inulin can be performed using either the direct or indirect approach. High-performance anion exchange chromatography with pulsed amperometric detection (HPAEC-PAD) has been accepted as the most powerful method for direct determination of inulin. However, because of the lack of a suitable standards for different DP of inulin, this method has difficulty in interpreting the elution order of sugar oligomers. On the other hand the anion exchange columns are very expensive. Indirect determination methods are based on hydrolysis of inulin followed by measurement of the released fructose and glucose by different techniques including HPLC-RI and spectrophotometry using various reagents [2]. In this study inulin content in roots of chicory were extracted by hot deionized water and then hydrolyzed by HCl 0.8M. The amount of D-glucose and D-fructose were determined before ( $G_1$ ,  $F_1$ ) and after ( $G_2$ ,  $F_2$ ) of hydrolyze with HPLC chromatography (zorbax carbohydrate column 250\*4.6- 5 $\mu$ m with RI detector). Then glucose and fructose which released from hydrolyzing ( $G_i$ ,  $F_i$ ) were calculated. At the end DP and inulin content were determined.

DP ( $n$ ) and inulin content ( $i$ ) were determined with two equations:

$$n = F_i/G_i + 1 \quad (1)$$

$$i = \{ [180 + 162*(n - 1)]/180*n \} * (F_i + G_i) \quad (2)$$

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**Investigation of Cytotoxic Effects of Scrophulavia Striatabois Extract on HT29 Clonal Cancer Cells By MTT**

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Given the developmental challenges of antibiotic resistance in bacteria, systemic toxicity and drug resistance in chemotherapy, the discovery of new biological compounds is essential. The use of herbal extracts for treating patients with infections and cancers can be considered. In this study, the extract of Scrophulavia strata was investigated on HT29 cell proliferation and apoptosis. The aqueous extract of the plant Scrophulavia strata significantly reduced the proliferation of the HT29 cell line. In general, more work is needed to examine the applications of these compounds, especially in medical and therapeutic areas.

**Keywords:** HT29, MTT, Scrophularia striata

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**Comparison of the Effects of Aloe Vera Gel and Zinc Oxide Ointment on Dipeper Rash in Children Aged 6 to 18 Months Referred To Health Care Centers in Firoozabad 2016-2017**

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Diaper dermatitis is a common skin disorder that causes restlessness in children and nursing infants are parental anxiety. Because of the high prevalence and complications of diaper dermatitis and due to the problems caused by the consumption of synthetic drugs, treatment with herbal medicines can be a useful treatment strategy. To compare the effect of aloe vera gel and zinc oxide ointment on improving diaper dermatitis in children 18-6 months referred to health centers Firoozabad city 1395-1396. This study is a single-blind randomized clinical trial on 40 children 6-18 months referred to health centers Firoozabad city, was carried out (1395-1396). Children were randomly assigned to two groups of consumers aloe vera gel and zinc oxide ointment, were recommended drugs used for three days. After three days to evaluate the incidence of adverse events were referred to the clinic and the incidence of infectious dermatitis, allergic or other new problems were re-examined and the absence of any problems, patients continued to use zinc oxide or aloe vera gel. Then on the seventh day the severity of dermatitis by the help of investigator (physician), who was unaware of the type of treatment, according to diaper dermatitis five-point scale, was recorded. Data using SPSS software, chi-square test, independent t-test were analyzed. The extent and severity of diaper dermatitis one week before and immediately after the intervention in aloe vera gel and zinc oxide ointment, there was no statistically significant difference ( $p > 0.05$ ). According to Wilcoxon test, dermatitis severity and extent of 3/45 to 1/7 and from 3/40 to 1/6 dermatitis decreased. Studies have shown that aloe vera gel and zinc oxide ointment impact on the improvement of diaper dermatitis is the same, it is suggested that due to the availability of aloe vera gel in the treatment of diaper dermatitis used.

**Keywords:** Aloe Vera gel, Diaper dermatitis, Zinc oxide

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**Bioinformatics study of Gene Encoding Limonene Synthase as First Plastid Enzyme Involved in Menthol Biosynthesis Pathway**

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(-)-(4S)-Limonene synthase represents the committed step of (-)-menthol biosynthesis by conducting the cyclization of the universal precursor GPP to the parent olefin of all subsequent p-menthane pathway intermediates. Interest in this monoterpene cyclase stems also from the fact that (-)-limonene is the precursor of carvone in the essential oil of spearmint. The cyclization leading to limonene is the simplest of all terpenoid cyclizations and the reaction has ample precedent in solvolytic model studies. Thus, it is not surprising that limonene synthase has become an archetype for this class of enzyme. The cDNA also encodes the highly conserved aspartate-rich DDXXD motif in the C-terminal catalytic domain that is found among the terpene cyclases and the distantly related prenyltransferases, consistent with the common role for this element in binding and ionizing prenyl diphosphate substrates. Protein BLAST (<https://blast.ncbi.nlm.nih.gov/Blast.cgi>) of limonene sSynthase revealed high identity between *Mentha* species (> 90%), *Agastach rugosa* (71%), *Schizonepeta tenuifolia* (69%), *Perilla citriodora* (64%) and *Salvia rosmarinus* (50%). Also Multiple Alignment (ClustalX 2.1) between 10 selected deduced amino acid of limonene synthase showed that the gene encoding of this enzyme is highly conserved. Secondary structure prediction was done by PSIPRED (<https://bioinf.cs.ucl.ac.uk/psipred>). Results showed that the secondary structure of limonene synthase is formed by helix and random Coil. Also for better understanding of features of limonene synthase tree dimensional structure predicted by <https://rcsb.org/pdp>.

**keyword:** Menthol, Terpenoids, Multiple alignment

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**Effect of Various Culture Medium on Biomass Yield, Total Phenol, Flavonoids Content and Antioxidant Capacity of *Hyoscyamus Pusillus* Hairy Roots**

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*Hyoscyamus* is one of the desert medicinal herbs of Solanaceae family. This plant produces some important compounds as secondary metabolites, mainly hyoscyamine and scopolamine, which exhibits a wide range of pharmacological and toxic activity. *Hyoscyamus pusillus* is a medicinal plant known as main source of tropane alkaloids such as hyoscyamine and scopolamine. Tropane-alkaloid biosynthesized mainly in Roots and hence roots culture system would be interesting method to raise production of valuable substances especially produced in medicinal plants. In order to increase secondary metabolite production in medicinal plants, different classic and modern approaches have been explored, such as selection of high yielding cell lines, growth media adaptation, elicitation, precursor feeding, Immobilization, large scale culture in bioreactor systems, hairy root culture, and biotransformation. Genetically transformed hairy roots obtained by infection of plants with *Agrobacterium rhizogenes* are suitable source for production of bioactive molecules due to their genetic stability, fast growth in hormone free culture media. The aim of this study was evaluation biomass production and phenol, flavonoids content and antioxidant capacity of *H. Pusillus* hairy roots in the different solid and liquid culture medium including: (1/4 MS, 1/2 MS, MS and B5). Hairy roots were induced from leaf explants infected by *A. rhizogenes* A13 strains. Analysis of biomass fresh (FW) and dry weights (DW) accumulation and biochemical traits was measured after 21 days of culture. The result revealed that in solid medium, the highest hairy root fresh and dry weight (2.54 and 0.143 g, respectively) were found in the B5 medium. In the case of liquid medium, the highest biomass (6.25 gr FW) and lowest biomass (3.64 gr FW) was obtained in B5 and 1/4 MS media, respectively. According to the results, the highest Total Phenol (3.26 mg GAE per g FW) and flavonoid (9.22 mg per g FW) content were observed in solid and liquid B5 medium, respectively. The highest antioxidant capacity (20.12%) and lowest (11.27%) were observed in liquid MS and solid 1/4 MS medium, respectively. The present study demonstrated that the composition of culture medium have significant impact on the Biomass and phytochemical characteristics of *H. Pusillus* hairy roots.

**Keywords:** *Agrobacterium Rhizogenes*, Hairy root, Solanaceae, Hyoscyamine

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**Effects of Lanthanum and Salt Stress on Germination and Seedling Growth of Dragonhead (*Dracocephalum Moldavica* L.)**

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Phosphate-based fertilizers (PF) are a major source of rare earth elements (REEs) pollution. The phytotoxicity of REEs is still poorly understood. However, positive impacts of REEs on plant growth may be restricted to certain growth stages or specific soil conditions. Germination of most species is reduced and delayed with a salinity increase, and plant responses may vary greatly depending on species. Medicinal plants has been extensively used in traditional medicine and often cultivated in arid and semiarid regions with salinity problem. In this research, the influence of salinity and lanthanum (La) as a representative REE, on seed germination parameters including germination percentage (GP %), mean germination time (MGT), germination rate (GR), germination index (GI) and seedling vigor index (SVI) in dragonhead (*Dracocephalum Moldavica* L.) for 14 days were evaluated. This project was designated in a two level factorial experiments based on completely randomized design with four replication. Seeds of dragonhead were examined at different salinity levels (0, -0.5, -0.1 Mpa) and La different concentrations (0, 25, 50, 75 and 100  $\mu$ M). The range of NaCl was selected to salinity level of groundwater resources using for irrigation in Arak, Iran. Results showed that salinity stress significantly affected dragonhead seed germination characteristics ( $p < 0.05$ ). Mean comparison showed that by increasing salinity, GP, MGT, GR, GI and SVI decreased ( $p < 0.05$ ). The dragonhead seeds endured osmotic potential up to -0/5MPa and the highest GP was observed in this level however increasing salinity causing reduced GP. La did not change the seed germination parameters of dragonhead in comparison to seeds treated with the control treatment. Also, the interaction of salinity and La was not significant. It is concluded that if La has effects on dragonhead germination, it can only occur at solution concentrations above 100  $\mu$ M or below 0.25  $\mu$ M. REEs are not known to be nutritionally essential in plants; however, many of these elements can compete with calcium in a number of calcium-mediated biological processes, which could account for some of the toxicity to plants. While the toxicity of REEs is generally considered low, new applications and developing technologies in the agricultural, automotive and telecommunication sectors may increase the environmental levels of various REEs, and in turn, the concentrations exposed to native plants and other wildlife. Due to the important questions surrounding the availability and toxicity of REEs to plants, studies shall be performed under conditions that are representative of real world situations.

**Keywords:** Seed germination, Lanthanum, Salinity, *Dracocephalum Moldavica*

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**Importance of *in vitro* Micropropagation of *Acorus calamus* (Acoraceae), a Rare Medicinal Plant in Iran.**

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*Acorus calamus* L. (vernacular: Vaj) is a perennial semiaquatic monocotyledon herb with aromatic and stout rhizome, well developed adventitious root and long ensiform leaves. The plant was rediscovered in 2013 after about 50 years from the last report in Iran. Vaj have been used in preparation of medicine, perfume and flavours. There are several usage of the plant in medicine; effective in bronchitis, affected heart, Lungs, pain in the liver and kidney. During 5 years' exploration in different areas of Iran, especially in Guilan, Mazandaran, Sistan va Bluchistan and kerman provinces, I found only three populations of Vaj in Mazandaran with restricted distribution. The largest population belong to the Arzefon locality with about 200 m<sup>2</sup> area, while Alandan and Pelesk populations area is lower than 50 m<sup>2</sup>. Although I saw the flowers of the plant in these localities every year, it was not observed any germination of seeds during this study. All plant reproduced by rhizome in asexual reproduction. Accordingly, I believe that Vaj is a rare plant in Iran and any exploiting of the plant from natural habitat will threaten the survival of Vaj in Iran. For providing the large scale disease free materials of the plant for medicinal, scientific research, health and food industries demand and also for conservational purpose of Vaj, the micropropagation of this plant by using *in vitro* tissue culture method, with native plant materials of Iranian population of *A. calamus* is necessary.

**Keywords:** *Acorus Calamus*, Micropropagation, Medicine, Perfume

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**Variation in Essential Oil Composition of *Satureja hortensis* L. under Different Harvesting Times**

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*Satureja hortensis* L. is an important medicinal plants belonging to labiatae family that origin from Mediterranean areas and cultured widely in the world countries. Ontogenetical variation is one of the factors affected on the yield and secondary metabolites in medicinal and aromatic plants. An experiment was carried out to identify the effects of harvesting times on the yield and essential oil composition on *Satureja hortensis*. Aerial parts of *Satureja hortensis* were harvested on pre-flowering and full flowering stages. Essential oil was obtained by hydro-distillation using Clevenger type apparatus during approximately 4 hours and analysed with GC and GC/MS. Twenty eight components were identified in *Satureja hortensis* essential oil at two harvesting times. The main components of the oil were carvacrol (54.73-63.54%),  $\gamma$ -terpinene (21.63-26.37%), *p*-cymene (2.85-5.47%) and  $\alpha$ - terpinene (2.82-2.42). The results showed that harvesting times caused significant effects on the yield and essential oil in *Satureja hortensis*. Also the amounts of *p*-cymene,  $\gamma$ -terpinene,  $\beta$ -caryophyllene and carvacrol were changed in different harvesting times. Harvesting time was significant affected on the carvacrol content as a major component on the essential oil of *Satureja hortensis* and the highest carvacrol content was observed in pre-flowering stage.

**Keywords:** *Satureja hortensis*, GC/MS, Ontogenetical variations, Essential oil

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## Two Novel Parthenolide-Anticancer Prodrugs: HPLC Method and Cytotoxic Activities

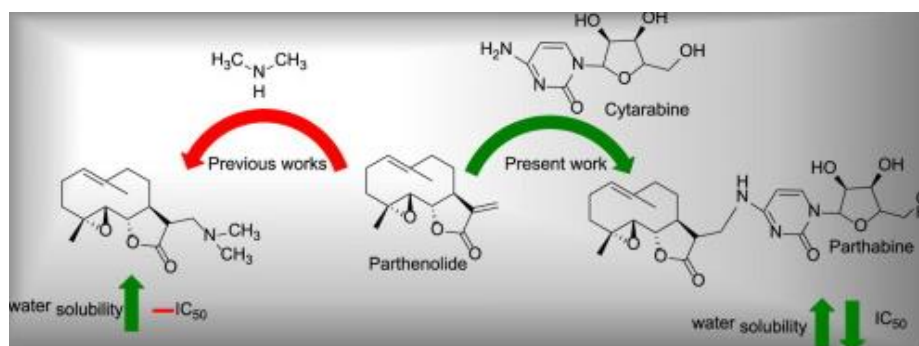
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Parthenolide is a potent anticancer sesquiterpene lactone, with poor solubility in water [1]. In previous studies, amino-derivatives of parthenolide failed to produce cytotoxic agents. We successfully synthesized two novel parthenolide-anticancer hybrids including parthabine and parthalan through the aza-Michael addition with better cytotoxic activity against MCF-7, CHO, LNcaP, Hep G2 cell lines (IC<sub>50</sub> of 0.2 μM to 5.2 μM) as well as better water solubility than the parent molecule. The <sup>1</sup>H NMR and <sup>13</sup>C NMR of synthesized compounds were confirmed by different 2D NMR spectra (HSQC and HMBC). Also we could separate a greater amount of hybrids from the reaction solution by HPLC method compare to silica gel glass plates method.



**Keywords:** Parthenolide, Parthabine, Parthalan, Aza-Michael Addition, Cytotoxic activity

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## Nanoemulsion Loaded with *Mentha longifolia* Essential Oil for Control of *Callosobruchus maculatus* (Bruchidae)

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These days by using nanoencapsulation technique, it is possible to overcome many limitations to use essential oils (EOs) such as low durability, insolubility and fast evaporation in order to control pests [1]. In this study, nanoemulsion (NEO) containing *Mentha longifolia* L. (Lamiaceae) oil has been produced and its effect in comparison with non-formulated EO on adult stage (1-3 days) of *Callosobruchus maculatus* F. has been analyzed. The results showed that the fumigant toxicity of NEO in first 24 hours after being experiment was lower compared with EO. The LC<sub>50</sub> values of EO and NEO were 10.1 and 16.1 μl/l, respectively. However, in the long term the EO's effect decreased and NEO's effect increase. At 25 μl/l (lethal concentration for 80% mortality), The LT<sub>50</sub> values calculated from EO and NEO were estimated about 2.2 and 11.1 days, respectively. at 10.1 μl/l, the EO had no durability, but the durability of NEO was 21 days. So, the slow-release formulations can cause conservation of toxicity properties of EO in long term, and can be used as an effective tool in organic agriculture.

**Keywords:** *Callosobruchus maculatus*, Essential oil, Fumigant toxicity, *Mentha longifolia*

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## Effect of Essential Oil and Extract of *Gontcharovia Popovii* on Pathogenic *Vibrio* Bacterial in Shrimp Ponds from Bushehr Province

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In this research, the effects of essential oil and extract of *Gontcharovia Popovii* on *Vibrio* species (*V. owensi*, *V. brasiliensis* and *V. harveyi*) isolated from shrimp pools of Bushehr Province were studied. Essential oil and extraction were obtained by Clevenger type apparatus and Soxhlet respectively. The antimicrobial activity of the essential oil and extract of *G. Popovii* on *Vibrio* species were assessed by disc diffusion and well diffusion methods and by recording inhibition zones (IZ) and minimum inhibitory concentrations (MIC). The results show that essential oil of *G. Popovii* have high antimicrobial activity against three pathogens. The higher antimicrobial activity were obtained on *V. brasiliensis* and *V. harveyi* compared with *V. owensi*. Also results show that the extract of *G. Popovii* have not significant antimicrobial activity on three *Vibrio* species.

**Keywords:** *Gontcharovia Popovii*, Antimicrobial activity, Essential oil, Shrimp ponds

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## Impact of Nano Fertilizers on Growth and Yield of Flixweed *Descurainia Sophia* L.

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To investigate the impact of nano fertilizers on seedling growth and grain yield of flixweed (*Descurainia Sophia* L.) a factorial experiment based on randomized complete block design was conducted in greenhouse with four replications. Treatments were three types of nano fertilizers including nano-composites bio organic (30 g/pot), uremic (10 g/pot in three stages) and biomik (dissolved in water, 30 g/pot) and chemical fertilizer treatment including nitrogen (10 g/pot) with phosphorus (15 g/pot) and potassium (10 g/ha). Results showed that, the chlorophyll content had the increasing trend up to silique development stage and the maximum amount was obtained in uremic (72.6 SPAD unit) and biomik (66.3 SPAD unit). The highest crop growth rate and leaf area was also observed in uremic and biomik at silique development stage. Finally, uremic fertilizer treatment had the highest seed nitrogen (3.1%), grain protein (22.3%) and grain yield (123.2 g/pot). Overall, results showed that application of uremic caused 19.5% increase in grain yield compared to chemical fertilizers, significantly.

**Keyword:** Chlorophyll content, Crop growth rate, Silique development, Uremic fertilizer

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## Biosynthesis and Antibacterial Activity of Silver Nanoparticle Using *Alcea*

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Green synthesis, as an alternative and environmentally friendly technique for the synthesis of nanoparticles, has been attracting increasing attention in recent years [1]. Among the various metal nanoparticles, silver nanoparticles have been gaining increasing momentum throughout the world. The bactericidal activity of silver is a well-established fact and it has along traditional record. Silver in nano form performs relatively much higher antimicrobial activity compared to its macroscopic counterpart. Plant compounds such as vitamins, enzymes, proteins, organic acids such as citrates, amino acids and polysaccharides for the reduction and capping. The green synthesized nanoparticles using *Alcea* exhibited an absorbance peak at 426 nm, characteristic for AgNPs. The TEM results revealed the obtaining of AgNPs with sizes varying within the range 20–60 nm, having almost star and spherical shapes. *Alcea* extract synthesized silver nanoparticles showed excellent antibacterial activity against *Bacillus subtilis* (Gram-positive) and *E. coli* (Gram-negative) with a zone of inhibition 24 and 14 mm, respectively. This improved antibacterial activity was found to be comparable with the standard drug.

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## Effect of Hydroalcoholic Extract of *Potentilla Reptans* on Oxidative Stress Biomarkers in Carbon Tetrachloride- Induced Hepatotoxicity in Rats

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In this study, the effect of hydro-alcoholic extract *Potentilla reptans* (HEP) on oxidative stress in carbon tetrachloride (CCL<sub>4</sub>) induced liver toxicity in male rats was investigated. 35 male Wistar-albino rats (200-250 g) were selected and divided into five experimental groups with seven rats in each group; negative control: treated with distilled water for 16 days, followed by Normal saline 0.9% , 1 ml /kg B.W, intraperitoneal (i.p) on day 16. Positive control: treated with distilled water for 16 days, followed by olive oil, 1ml/kg B.W, i.p on day 16. Sham Group: treated with distilled water for 16 days, followed by single dose of CCL<sub>4</sub> 1:1 with olive oil 50%, 1ml/kg B.W, i.p on day 16. Treatment groups 4 and 5 received daily doses of 100 and 250 HEP for 16 days, then on day 16 of a single dose of CCL<sub>4</sub> 50% and olive oil with a 1: 1 ratio of 1 mg / kg BW as i.p received. 48 hours later, observing the ethical principle, the animals were sacrificed and direct blood sampling was performed and then the activity level of GPX, SOD, CAT and also the amount of TP and TP in standard groups were measured in comparison with the control and control groups. The results of this study showed that for all of the biochemical parameters in the control group were statistically different with other groups (p <0.05). Only in the case of CAT enzyme, the concentration of 100mg/kg and 250mg/kg of HEP treatment groups with the zero concentration group was not significant. The HEP has antioxidant properties and reduces the toxic effects of carbon tetrachloride in the liver.

**Keyword:** *Potentilla reptans*, Carbon-tetrachloride, Antioxidant activity, Hepatotoxicity

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## Antioxidant Activity Study of *Plantago Lanceolata* Using Electrochemical Methods

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In recent years, more attention has been devoted to herbal medicines. Up to now, many compounds with therapeutic effects has been extracted from the herbs. The aim of this study was to evaluate the antioxidant activity of *Plantago lanceolata*. We have investigated antioxidant activity of *Plantago lanceolata* using cyclic voltammetry method. The kinetic data were extracted from cyclic voltammograms with the help of digital simulation. The homogeneous and heterogeneous rate constants were estimated by comparing the experimental cyclic voltammetric responses with the digital simulated results. The extraction of *Plantago lanceolata* was performed by maceration method for dried flower samples. The aqueous extract was obtained by adding 1.00 liter of boiling water to 500 g of powdered plant material in a 2.50 liter flask and incubated at room temperature for 8.00 h on a rotating shaker (200 rpm). The aqueous extract was filtered using Whatman paper at 45°C using a rotary evaporator. In recent decades, the oxidation potentials determined by cyclic voltammetry, enable a comparative investigation of the antioxidant potency of phenolics, hydroxycinnamic acids and flavonoids with distinction between substrate types. Low oxidation potential values reflect the propensity of a given molecule for electron donation and thus, for exhibiting significant antioxidant (antiradical) activity. The oxidation behavior of *Plantago lanceolata* was studied by cyclic voltammetry in a solution of 200 mM its extract in acetate buffer at pH=5. In the first cyclic voltammetry, two anodic peaks observed at scan rate V=100 mV/s, first peak at E<sub>pa</sub>=0.660 V and second peak at E<sub>pa</sub>=850 V. On the cyclic voltammetry negative-going scan, two small cathodic peaks, peak at E<sub>pc</sub>=-0.35 V and peak at E<sub>pc</sub>=-0.48 V appeared. These two peaks correspond to the reduction of the *Plantago lanceolata* oxidation product formed at the GCE (glassy carbon electrode) surface during the first positive going scan.

**Keywords:** Antioxidant, Electrochemical, Cyclic voltammetry

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## Therapeutic Effects of Combination of Vitex Agnus-castus Extract and *Nigella Sativa* Powder with Citalopram on Menopausal Symptoms

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Menopause is defined by permanent cessation of the primary functions of the human ovaries. The resulting lowering of estrogen hormone is considered as an important factor for the menopausal symptoms. The aim of this study was to investigate the therapeutic effect of a combination of dried Vitex agnus-castus with Nigella sativa powder on symptoms of post-menopausal women and comparison with citalopram treatment. In this study, 46 postmenopausal women referred to the clinic of Golestan health centers during 1395-1396 with a hot flush complaint were assessed in a clinical trial with citalopram control over an 8-week period. Patients were divided equally into two treatment groups: Group 1 (23 patients) received 1000 mg of the herbal combination (Vitex agnus-castus, Nigella Sativa powder) plus 20 mg citalopram. Group 2 (23 subjects) received 20 mg citalopram plus placebo. Menopausal rating scale (MRS) questionnaire was used to compare the variables in the two groups. The mean age in the herbal treatment group was 49.91 years and in the control group was 50.521 years, and t-test did not show this difference to be significant. ( $p = 0.360$ ). There was, however, significant improvement in the psychological ( $p = 0.001$ ), physical ( $p = 0.008$ ) and vasomotor symptoms ( $p = 0.00$ ) in group 1 patients compared to the control group. The present study showed that the combination of Nigella Saliva and Vitex agnus-castus generally reduces menopausal symptoms in postmenopausal women. Based on the results obtained, the plants mentioned can be used as adjunct to citalopram for the treatment of hot flushes in menopause.

**Keywords:** Menopause, Flushing, Citalopram, *Nigella Sativa*

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## The Effect of Aleo vera in Healing Diabetic Foot Ulcers

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Diabetic foot ulcers are one of the major causes of morbidity and mortality in diabetic patients also a serious danger to millions of person all over the world, that can create irreversible consequences for patients. For centuries Aleo vera has been used in treatment of diabetic foot ulcers. This study was aimed at evaluation the effect of Aloe Vera cream dressing on the diabetic foot. In a double-blind clinical trial, DM type 2 attending ghaem hospital who had ulcers of grade 1 or 2 based on Wegener scale on the toes, heels or dorsum's of foot were divided randomly in to two groups (17 cases and 17 controls). Data were analyzed by analytic statics (t-test, ANOVA and chi-square) by SPSS-18 soft ware. At the end of 4th week, mean score of case group was  $328.35 \pm 62.72$  and control group  $287.05 \pm 55.108$  t-test showed meaningful difference ( $p = 0.04$ ) in favor of the results in better mean case group and ANOVA test showed meaningful difference ( $p = 0.07$  and  $F = 8.039$ ) during the 4 weeks of study and intervention with Aloe Vera cream in case group. Aloe Vera cream dressing is effective in the healing process of diabetic foot ulcers. The use of Aloe Vera cream is recommended due to low cost and easy usage without any side effect. Aloe Vera cream can be considered as an additional therapy for diabetic foot ulcers.

**Key words:** Diabetic foot ulcer, Aloe Vera cream, dressing.



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## The Forage Quality of Yellow Sweetclover in Agri-Silviculture System (Plum Trees)

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Arbuscular mycorrhizal fungi (AMF) supply the host plant with mineral nutrients and water, in replace for photosynthetic products. The AMF symbiosis alleviates the drought-induced restriction in plant growth [1]. Yellow sweetclover (*Melilotus officinalis* L.) is known as a medicinal plant. This plant is a species of legume native to Eurasia [3]. Sweetclover is consumed by a variety of large and small herbivores. A split-plot experiment was conducted for 2 years (2016-2017) based on complete block design with three replications at plum (*Prunus domestica*) orchid, located at North-West of IRAN (37°62'N and 44°58'E, altitude 1333 m). The forage quality of yellow sweetclover to inoculation with two species of AMF (*Funneliformis mosseae* or *Rhizophagus irregularis*) was evaluated under different irrigation systems (rainfed and supplementary). There were no significant effects of AMF on the percentage of leaf nitrogen at different irrigation systems. In both two irrigation systems, mycorrhization with *R. irregularis* increased weight percentage of leaf (22.98%) and leaf ratio to aerial parts (43.03%) compared to untreated control plants in 1<sup>st</sup> year. In rainfed system, the highest leaf percentage (36.95±0.03) and leaf ratio to aerial parts (70.90±0.20) were obtained from mycorrhizal plants (*F. mosseae*) in second year. Despite rainfed system, decreasing the leaf percentage and leaf ratio to aerial parts were observed in mycorrhizal plants in 2<sup>nd</sup> year. In summary, effect of AMF on leaf percentage and leaf ratio to aerial parts relates to the irrigation systems and year in forage production.

**Keywords:** Forage, Irrigation System, Leaf Nitrogen, Mycorrhizal Fungi, Sweet Clover

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## Antimalarial Assessment of *Cichorium intybus* L. Used in Iranian Traditional Medicine for the Treatment of Fever by Heme Polymerization Inhibition Method

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*Cichorium intybus* L. is a grassy plant that grows in the humid regions and has been used to treat liver diseases and complicated and tropical fevers in Iranian traditional medicine (ITM), since *C. intybus* has cold and humid temperament which is similar to the temperament of liver that is involved in malaria. On the contrary the temperament of fever that is the most important symptom of malaria. The most important symptom of malaria is fever which was called "Hommi" in ITM. The medicinal plants that have been used for the treatment of fever in ITM could be suitable candidates for evaluating antimalarial effects [1]. In this study, the antimalarial effects of *C. intybus* which has been used for the treatment of fever in ITM, has been evaluated by heme polymerization inhibition method. The fractions were prepared through maceration during five consecutive days using petroleum ether, chloroform, methanol, hydroalcoholic (70%) and water, each day the mixture was filtered and the next fresh solvent was added to the dry plant residue. The heme polymerization inhibition method was carried out in 96-wells plate at final concentration of 200 µg/mL for each sample. The absorbance was recorded at 405 nm with an ELISA reader and the heme polymerization inhibition was determined. The results demonstrated that the petroleum ether, chloroform, methanol, hydroalcoholic and aqueous fraction of *C. intybus* inhibited heme polymerization up to 0, 100, 37, 0 and 45% respectively while the chloroform fraction of *C. intybus* L. showed the most considerable result. The results introduce the chloroform fraction of *C. intybus* as a proper candidate for further antimalarial studies.

**Keywords:** Antimalaria, Heme polymerization inhibition, Iranian traditional medicine, *C. intybus*

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## Effect of Corm Weight and Planting Density on Saffron (*Crocus Sativus* L.) Yield and Characteristics of Daughter Corm between Apple Trees in Firouzabad Village of Yasouj

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Given that saffron is a plant that its growth and development are coincided by apple tree inactive phase and also flowering and development stages have little interference with the tree, on the other hand because of synchrony of rainy seasons with plant growth, it can be a good candidate for agroforestry in apple gardens of semi-arid regions as Iran. So this experiment aimed to evaluate the effect of corm weight and plant density on saffron yield. The experiment carried out as factorial based on randomized complete block design with three replications in 2015-2016 growing seasons. First factor included of corm density in three levels (30.8, 40 and 57.1 corm.m<sup>-2</sup>) and second factor included of corm weight in four levels ( $\leq 6.0$ , 6.1-8.0, 8.1-10.0 and  $>10.0$  gr). Results showed that maximum fresh and dry stigma yield, corm yield, corm number and dry stigma yield in garden area were achieved from combination of 57.1 corm m<sup>-2</sup> and 10< gr weight in two years. Given that saffron yield consist of stigma dry weight and corm weight, it seems that sowing corm of 10< gr weight and 57.1 corm m<sup>-2</sup> can produce proper yield, especially at first and second years, that apple trees canopy is not completed yet.

**Keyword:** Corm yield, Corm weight, Density, Saffron, Stigma yield

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## Investigation of Tomato (*Lycopersicon esculentum*) and Peppermint (*Mentha piperita*) Cultivars Under the Influence of Different Planting Sites on Quality and Quantity of Peppermint

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In order to study the compilation of tomato and peppermint under the influence of different planting sites on the quantitative and qualitative characteristics of peppermint, a split plot experiment was conducted in a randomized complete block design with three replications in 1395 at the research farm of Karaj Agricultural College, Mahdasht Karaj was done. The main factors of the experiment include manure, fertilizer and sub-factors including tomato tomatoes, 75% tomatoes with 25% peppermint, 50% tomatoes with 50% peppermint, 25% tomatoes, 75% peppermint and single-pomegranate peppermint. Peppermint was peppermint. The measured traits were plant height, number of stems, essential oil content, parity ratio and relative overload factor. The application of manure in the culture bed increased the ratio of leaf to stem compared to chemical fertilizer, and the use of fertilizer was more congested. The maximum leaf to stem ratio was observed in combined cropping of 25% tomato with 75% peppermint and 25% peppermint with 25% tomato. In general, the use of fertilizer and combination of 50% tomato with 50% peppermint had the most positive effect on the plant.

**Keywords:** Tomato, Peppermint, Composting, Cultivating

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## Molecular Study of the Garlic Extract and Gentamicin Effects on *icaA* Biofilm Gene Expression in ATCC 25923 Strain of *Staphylococcus aureus*

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*Staphylococcus aureus* is one of the most common bacterial pathogens. Infections of this bacterium become chronic due to the formation of biofilms in injuries and implants. Biofilm cells are more resistant to antimicrobial agents for biofilm acts as a barrier to antimicrobial agents [1]. It is estimated that biofilms are associated with 80% of microbial infections. Biofilm production requires the presence of the *icaADBC* gene group and the strains carrying this genetic group have potential for biofilm production [2]. Gentamicin is one of the antibiotics that is effective in treating staphylococcal infections, but unfortunately due to biofilms, the effect of this antibiotic is sometimes confronted with the problem. For this reason, researchers have tried to test the combination of antibiotics with natural ingredients to control staphylococcal infections. Garlic (*Allium sativum*) is a species of Alliaceae family. There are numerous reports of antimicrobial activity of garlic extract against gram positive and gram negative microorganisms. In this study, based on the Real-time PCR, the *icaA* gene expression level under the treatment of garlic extract as well as gentamicin was evaluated. In addition, the simultaneous effect of garlic extract and gentamicin on *icaA* biofilm gene expression was also investigated. The results of this study showed that garlic extract alone can reduce *icaA* biofilm gene expression by 36% compared to control samples. Gentamicin alone reduced the expression of this gene by about 41%. The simultaneous effect of garlic extract and gentamicin resulted in a significant reduction of *icaA* biofilm gene expression in ATCC 25923 strain of *Staphylococcus aureus*, so that the expression of this gene was reached to about 25% of the untreated samples.

**Keywords:** *Staphylococcus aureus*, Garlic Extract, Gentamicin, Biofilm, *icaA* gene

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## Quality and Quantity Control of Herbal Medicine Products Derived of *Thymus vulgaris*

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The genus *Thymus*, member of the Lamiaceae family, contains about 400 species of perennial aromatic, evergreen or semi-evergreen herbaceous plants with many subspecies, varieties, subvarieties and forms. *T. vulgaris* (thyme) is widely used in the Romanian folk medicine for its expectorant, antitussive, antibronchitic, antispasmodic, anthelmintic, carminative and diuretic properties. The aim of this study is evaluation of quality of thyme products in the province of Tehran. For this purpose, pharmaceutical herbal products containing extract or essential oil of thyme (in the form of oral drop and syrups) were purchased from pharmacies in the province of Tehran. Microbial, physical and chemical control tests were carried out based on the standards and information obtained from the British, United States and Iranian herbal pharmacopeias in order to ensure the quality of the products. The physical properties of the eight product (the seven syrups and one oral drop) were evaluated such as transparency, color, odor, taste, pH, density, dry residue and stability assessment. In addition to physical tests, the amounts of active ingredients (thymol) of all products were evaluated. Dispersive liquid-liquid extraction was used for extraction of thymol before gas chromatography-mass spectrometry analysis. The obtained results of microbial, physical and chemical tests, showed that some products didn't have enough quality and some of them were confirmed.

**Keywords:** *Thymus vulgaris*, Quality control, Herbal product, Thymol, Syrups

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## Study on Fumigant Toxicity of Two Plant Essential Oils on Adult Insects of *Tribolium Castaneum* Herbst.

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Recently, there has been growing interest in research concerning the possible use of plant extracts as alternatives to synthetic insecticides. Essential oils are among the best-known substances tested against insects. These compounds may act as fumigants, contact insecticides, repellants, antifeedants and may affect growth and development of the insect. In an attempt to find a natural and inexpensive method for the control of stored-product pests. Fumigant toxicity of essential oils of *Cupressus sempervirens* L. var. *horizontalis* (Mill) Gord and *C. sempervirens* L. var. *stricta* Ait was investigated on adult insects of *Tribolium castaneum* Herbst on laboratory condition (27±1°C, 75 ± 5% R.H., dark cycle: 12:12 h). The oils were extracted by using Clevenger apparatus. The results showed that the percentage of mortality was increased with increase in concentration and exposure of time. At the 428.57 µL/L air dose level, *C. sempervirens* L. var. *horizontalis* (Mill) Gord and *C. sempervirens* L. var. *stricta* Ait essential oil caused 100 and 49 % mortality of *T. castaneum* adults within 72 hours of exposure, respectively. The LC<sub>50</sub> after 72 h for *C. sempervirens* L. var. *horizontalis* (Mill) Gord and *C. sempervirens* L. var. *stricta* Ait were 301.8 and 486.33 µL/L air, respectively. The results suggested that essential oil of *C. sempervirens* L. var. *horizontalis* (Mill) Gord could be used as a potential bio-control agent for stored-product insects.

**Keywords:** Fumigant toxicity, *Tribolium castaneum*, Essential oils

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## The Effectiveness of the Biological Activity of Essential Oils Form Three Species of *Nepeta Spp.* Against *Sitophilus Oryzae* L.

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The rice weevil, *Sitophilus oryzae* is major and cosmopolitan insect. Adults of *S. oryzae* is insatiable feeders on a great variety of grains. This study was conducted to estimate the insecticidal effect of essential oils from *Nepeta cataria* L., *Nepeta pogonosperma* Jamzad & Assadi and *Nepeta crassifolia* Boiss. & Buhse against *S. oryzae*. Bioassays were performed to determine the insecticidal activity of essential oils from mentioned medicinal plants against the *S. oryzae*. Mortality of insects were determined through fumigant toxicity. Bioassay were conducted with airtight exposure chamber in lab conditions (27±1°C, 75 ± 5% R.H., dark cycle: 12:12 h). Essential oils were obtained by Clevenger-type water distillation. The LC<sub>50</sub> after 72 h for *N. cataria*, *N. pogonosperma* and *N. crassifolia* were 152.63, 150.49 and 212.31 µL/L air, respectively. At the 214 µL/L air dose level, *N. cataria*, *N. pogonosperma* and *N. crassifolia* essential oil caused 75, 81, and 44% mortality of *S. oryzae* adults within 72 hours of exposure, respectively. Based on the LC<sub>50</sub> values, the essential oils from *N. pogonosperma*, *N. cataria* were the most active against *S. oryzae* than the essential oils from *N. crassifolia*. The results suggested that essential oil of *N. cataria*, *N. pogonosperma* could be used as a potential bio-control agent for stored-product insects.

**Keywords:** Biological activity, *Nepeta spp.*, *Sitophilus oryzae* L.

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## Half-Life Mortality of *Eucalyptus Globulus* and *Eucalyptus Camaldulensis* Essential oils Against *Sitophilus Oryzae* L. Adults

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The persistency (half-life mortality) of *Eucalyptus globulus* and *E. camaldulensis* essential oils against *Sitophilus oryzae* L. were determined using the method described by Hariri moghadam *et al.* (2011) with some modifications. This test was conducted using a completely randomized design, with time used as a variable, and each treatment and the controls were replicated 4 times. First, the filter papers (2 cm diameter) were soaked with *Eucalyptus* oils (*E. globulus* and *E. camaldulensis*) at 100 µl/l air. The soaked filter papers were attached to the screw caps of 40 ml glass vials. The caps were screwed tightly on to the vials and they were kept under laboratory conditions (with 8:16 h light: dark cycle, 27 ± 1 °C and 70 ±5% R.H). After 24 hours, 20 adults (3-day-old) of *S. oryzae* were placed in each bottle and mortality was recorded at 24 h after treatment. There was a clear trend towards reduced mortality of the introduced insects with increasing time. The mortality in adults of *S. oryzae* started to reduce after three days. In the case of *E. camaldulensis*, the half- life mortality of the oils against *S. oryzae* was notable and 100% mortality was observed when the insects were introduced to the treated vials three days after application of the oil. The mortality was reduced to fifty percent at 6 days after oil application. Finally, after ten days, the mortality was reduced to 0% [1,2].

**Keywords:** Half-life mortality, *Eucalyptus globulus*, *Eucalyptus camaldulensis*

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## Time Response Effects on Adults of *Tribolium Castaneum* Herbst

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A completely randomized design was used for the Time response (LT<sub>50</sub>) bioassay. Dose and time were used as variables and each treatment and the controls were replicated 4 times. *Tribolium castaneum* were fumigated for different exposure times (0.5, 1, 2, 3, 4, 5, 6, 7 and 8 hours) and at three doses (50, 100 and 250 µl/liter air) of the *Eucalyptus camaldulensis* and *E. globulus* essential oils. Mortality was recorded 24 h after treatment. The *E. camaldulensis* and *E. globulus* essential oils acted very fast against *T. castaneum* and caused mortality very quickly on the treated insects. There was a clear trend of increasing mortality of the treated insects with increasing exposure time. The mortality in adults of *T. castaneum* started after one hour of exposure and there was a marked increase in mortality of the insects with increasing exposure time. In the case of *E. camaldulensis*, the average mortality rate over the different exposure times (2, 3, 4, 5, 6, 7 and 8 hour) were 7.5, 20, 34, 54, 70, 94 and 100%, respectively. Similar to the results obtained for *E. camaldulensis* essential oils, the toxicity of *E. globulus* essential oils against *T. castaneum* increased gradually with increase in exposure time. After 2, 3, 4, 5, 6, 7 and 8 hours of exposure the resulting mortality against adults of *T. castaneum* were 15, 27.5, 35, 47.5, 70, 92.5 and 100%, respectively.

**Keywords:** Time response, *Tribolium castaneum* Herbst, Mortality

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## Comparative Study of Cumin Aldehyde and Para-Cymene Effects on Mice Liver Tissue's Antioxidant Activity after 24 Hours of Incubation *In vitro*

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medicinal plants active components have valuable biochemical effects. The aim of this study was to assess the effects of cumin aldehyde and para-cymene, the two standard active ingredient of cumin, on the activity of antioxidant enzymes and the levels of oxidative damage biomarkers in the rat liver. Enzyme activities and malondialdehyde levels was evaluated by spectrophotometry and HPLC methods respectively. The results showed that both compounds in the intermediate concentration range (40 and 80 BM) have the ability to increase the liver tissue antioxidant activity Such that the superoxide dismutase, catalase and glutathione peroxidase activities shows significant increasing 34%, 37% and 48% respectively under cumin aldehyde effect respect to the control condition. The activity of these enzymes under the para-cymene influence showed a significant increase of 65%, 17% and 41% compared to the control condition. On the other hand, the levels of oxidative damage biomarkers decreased significantly in these concentrations which could be due to the positive effect of antioxidant activity in inhibiting the macromolecular oxidative damages. Therefore, since these compounds have significant stimulatory antioxidant properties on the liver, they can be used to protect liver against oxidative stress and disease.



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## Identification of Phytochemical Constituents and Antiradical Properties from Various Solvent Extracts of *Polystichum Setiferum*

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Ferns are generally used in traditional medicine for the cure of many deadly diseases like skin problems, wounds, cough and protect the liver and treat the hepatitis. According to the last studies on the pteridophytes of Iran, occurrence of 52 species in 26 genera and 15 families are confirmed. *Polystichum setiferum*, commonly called soft shield fern, is a tufted evergreen to semi-evergreen fern with lance-shaped, bi-pinnate, medium green fronds that grow in shuttlecock form. To our knowledge, bioactivity and phytochemical investigations of *P. setiferum* are scarce. Hence, the objective of this study was to assess the total polyphenol, flavonoid, flavonol and anthocyanin contents, as well as radical scavenging activity of ethanol, methanol and aqueous methanol extracts of *P. setiferum*. Antioxidant activity of the samples were determined by 2, 2-diphenyl-1-picrylhydrazyl (DPPH) method. In the DPPH test, methanol extract showed the highest radical scavenging activity with an IC<sub>50</sub> value of 26.86±1.12 µg/mL, Higher antiradical potential than BHA as positive control (IC<sub>50</sub>=59.77±0.61 µg/mL). Phytochemical constituents were determined using spectrophotometric methods. Among the extracts, methanol extract was containing the highest amount of phenolic compounds (119.65±1.71 mg gallic acid /g dry extract). Large differences in the amount of flavonoids and flavonols of *P. setiferum* in various extracts were detected. Ethanol extract has been found to be rich in flavonoids and flavonols with a value of 101.28±1.77 and 64.96±0.95 mg quercetin/g dry extract, respectively. The total anthocyanins were estimated by a pH-differential method. The high anthocyanin content was found in ethanol extract (21.68±0.72 mg cyanidin-3-glucoside equivalents per 1 g fresh weight). The results suggest that the potent antioxidant activities are justified by high concentration of phenolic constituents present in the extracts. Due to the harmful effects of synthetic antioxidants, natural novel antioxidants have become the focus of attention for protecting foods and beverages and reducing oxidative stress *in vivo*.

**Keywords:** *Polystichum setiferum*, Phytochemical constituents, Antioxidant, Various solvents

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## Effects of Water Stress and Biochar on the Growth of *Laurus nobilis* L.

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Water deficit stress affects plant growth and metabolism in medicinal plants. *Laurus nobilis* (bay laurel) is a large shrub with aromatic evergreen leaves also it is one of the most important medicinal plants that have numerous medical uses. In order to study the effect of drought stress and biochar on growth and leaf biomass of *Laurus nobilis* an factorial experiment under randomized completely block design was conducted with three replications. Seedlings of bay laurel were exposed during three months under drought stress and biochar treatment at greenhouse of Ghaemshahr Horticultural Research Station. Water deficit levels included 100% field capacity (control), 60% field capacity (mild stress), and 40% field capacity (severe stress). Biochar levels included 2, 4, 6 gr in each 1 kg of soil and without biochar (control). Concerning 4.3 kg sandy loam soil was placed in each pot. Results showed that enhance water deficit (severe stress) declined plant height, diameter, leaf weight and leaf area so that water stress significantly decreased height of seedlings from 60% under severe stress. However, plant growth increased with increasing biochar levels. In general, the experiment results indicated that relative tolerance of bay laurel to mild stress and biochar improves soil quality.

**Keywords:** Biochar, Growth, *Laurus nobilis*, Water stress

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## Identification of Fatty Acid Methyl Esters Profiling of Oil Seeds and Plants by GC-MS Coupled with Chemometric Methods

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Herbal oils are lipids extracted from the plants or oily seeds. Lipids consist of fatty acids (FAs) classified according as saturated, monounsaturated and polyunsaturated FAs; further, as cis or trans and the position of the first double bond. Common procedures for the analysis of FA methyl ester mixtures generally have employed gas chromatography (GC) on capillary columns with polar stationary phases such as cyanopropylphenyl-methyl polysiloxane and cyanopropyl aryl-polysiloxane columns, polyethylene glycol (PEG) columns and nitroterephthalic acid modified polyethylene glycol (FFAP) columns. Such methods have proven useful in the analysis of the FAs; however, even polar columns do not have sufficient resolving power to separate geometrical and positional isomers of the unsaturated acids. These polar columns have maximum operating temperatures less than 250° and are very sensitive to oxygen and moisture in the carrier gas. Also, analysis of the long-chain (> C28) acids is not feasible with such columns and is generally performed on non-polar columns. With non-polar columns, the partial separation of many polyunsaturated FAs and long-chain FA has been observed, but the resolution of certain FA was insufficient to permit identification. This study describes a computer-based procedure for peak separation and identification, and the application of this procedure to the analysis of complex FA methyl ester samples derived of aniseed oil (*Pimpinella anisum*, Apiaceae), flaxseed oil (*Linum asitatisimum* L, Linaceae), castor oil (*Ricinus communis* L, Euphorbiaceae), sesame oil (*Sesamum indicum* L, Pedaliaceae), on a non-polar capillary column. In this study, geometrical and positional isomers of FAs such as palmitic, oleic, stearic,  $\alpha$ -linoleic and linoleic acid that extensively exist in the plant oils were resolved and identified by chemometric resolution methods after GC-MS analysis. Results demonstrated that it would be possible to separation and analysis complex FA methyl ester samples, containing long-chain acids, on non-polar columns, with the help of chemometric resolution methods.

**Keywords:** Fatty acids, Herbal oils, Gas chromatography-mass spectrometry

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## Effect of Fenugreek Seeds Powder on Amount of Gastricemptying and Increasing Food Tolerance in Mechanically Ventilated Patients.

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Delayed gastric emptying is the major problem with mechanically ventilated Patients, which causes food intolerance. The use of drugs has side effects and limitations. Regarding the effect of Fenugreek seeds on the treatment of some gastrointestinal disorder, this study aimed to determine the effect of fenugreek seeds powder on the amount of gastric emptying and increasing food tolerance in mechanically ventilated patients hospitalized in the intensive care unit. Methods and Materials In this randomized double blind clinical trial, 60 mechanically ventilated patients divided into two groups of intervention and control (n = 30). Patients in the intervention group received 3 grams of fenugreek seed (twice a day) and the control group received only routine measures. Gastric residual volume was measured in the admission time and before the gavages. The mean gastric residual volume of the admission time and the 1-5 days after the admission were compared in the two groups. Data were analyzed using the independent *t*-test, Chi-squared test, covariance analysis and repeated measured tests in the SPSS-20 at a significance level of 0.05. The results revealed that there were no differences between the two groups in the admission time and the first day ( $P > 0.05$ ). There were statistically significant differences between the two groups in the admission time and 2-5 days after the admission ( $P < 0.05$ ). The difference of mean scores of gastric residual volumes was significantly different between the two groups during the five days of post intervention constantly (Repeated measured ANOVA;  $p = 0.001$ ). recommended to use fenugreek seeds in patients' diet to improve gastric emptying and prevent delayed gastric emptying complications.

**Keywords:** Fenugreek seeds, Gastric emptying, Food tolerance, Mechanical ventilation



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## Cleansing Tonic Skin and Anti Acne Derived from Tamaix Herbs

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Tamaix plant with Tamaix Scientific Name is a plant from spinach family and has about 39 large daisies with lily. Tamaix plant with 54 species has the largest group in this species, it grows naturally in southern Europe, northern Africa and the Middle East, and in Iran it grows in the provinces of Bushehr, Sistan and Baluchestan, Khorasan, Kerman, Hormozgan and Khuzestan. Tamaix plant has tree and shrub whose leaves are accelerate it grows in dry places, beside of Dandruffs and sandy plains, containing about 40% of tannic and vitamin-rich acids. Its skin has astringent and appetizing effect, it is strengthening for stomach and its root is used in the treatment of mumps and Swollen of kids and its leaf is used in the treatment of infection of gum. In the present study, the effect of Tamaix herb on the target group, which was a group of 24 to 32 years old persons and they were suffered from acne, was investigated. The results showed that in 90% of the subjects, the inflammation and its effects were completely eliminated, and the remaining 10% also significantly improved.

**Keywords:** Cleansing, Skin, Acne, Tamaix herbs

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## The Effects of Hydro-Alcoholic Extract of *Withania coagulans* on Antioxidant Status and Sperm Parameters Following Testosterone Administration in Rat

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Enhancement of testosterone levels or using improperly and arbitrarily of testosterone can disrupt fertility. Today, the use of medicinal herbs for the treatment of hormonal disorders and infertility has been considered. In the present study, the effects of hydro-alcoholic extract of *Withania coagulans* (WCE) on sperm count and viability, gonadosomatic index, malondialdehyde (MDA) level and total antioxidant capacity (TAC) were investigated in testis of rats following testosterone injection. In the current experimental study, 48 male Wistar rats were divided into 6 groups (n = 8). Control, Sham, Testosterone propionate (TP), and 3 TP treated with WCE (250, 500, and 1000 mg/kg/day). TP 3 mg/kg/body weight was injected subcutaneously and vehicle or WCE was administrated by oral gavage for 4 weeks. At the end of the gonadosomatic index, sperm count and viability, MDA and TAC level were measured. The results showed a significant decrease in gonadosomatic index, sperm count, sperm viability and TAC level and increase in MDA level in TP group compared to control group (p<0.001). WCE significantly improved the sperm qualitative parameters and TAC, and decreased MDA level in the treated groups as dose dependently (P < 0.05). It seems *Withania coagulans* extract could improve the fertility parameters, and might be useful to treat infertility problems although more research is required.

**Keywords:** *Withania coagulans*, Testosterone, Total antioxidant capacity, Malondialdehyde, Rat

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## Investigate the Effect of *Scrophularia striata* Plant Fumigation on Dental Infection

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Hundreds of plants worldwide are used in the traditional treatment of bacterial infections, whose antimicrobial effects have been proven in vitro. The necessity of using medicinal herbs is that common chemical drugs have side effects and drug resistance and high economic costs for society and the family. On the other hand, ease of use and general acceptability has provided a suitable basis for the use of medicinal plants. The aim of this study was to investigate the effect of *Scrophularia striata* plant fumigation on dental infection. The study population included three dental clinics in Kermanshah. During these three consecutive days, at the same time, were select 146 patients with dental infection confirmed by dentist. Initially, the purpose of the study and its methodology were explained to the participants in the study and informed consent was obtained from them. Then, the patients were randomly assigned into intervention and control groups. In the intervention group, the participants used from *Scrophularia striata* plant fumigation once a week and in the control group, oral administration of prescription Cephalexin antibiotics was used by the dentist and after a week's, they were examined by a dentist. Data was recorded in the data collection form. Finally, the data were analyzed using spss version 24 software. Of the 73 patients in the control group (using Cephalexin antibiotics), in the second-examination, 8 patients had dental infection, while in the intervention group (using *Scrophularia striata* plant fumigation), in the second-examination, 3 patients had dental infections. It was statistically significant (P-value=0/001). The results of this study showed that *Scrophularia striata* plant fumigation is effective in treating dental infection. Further studies in this field are necessary.

**Keywords:** Dental infection, *Scrophularia striata* fumigation

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## Using Chamomile Extract as an Antibiotic Replacer in Broiler's Diet

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This study was conducted in order to investigate the effect of different levels of alcohol extracts of chamomile as an alternative to antibiotics on yield, carcass characteristics, some blood biochemical parameters and immune response of broilers. This experiment carried out based on completely randomized design with 400 day-old Ross-308 broiler chicks with 5 treatments and 4 replicates (20 birds per replicate). The five treatments were as follows, 1: control group (without alcoholic extracts of chamomile and antibiotics); 2: antibiotics (5 mg lincomycin per kg diet); 3: 0.1 percent alcoholic extracts of chamomile; 4: 0.2 percent alcoholic extracts of chamomile; and 5: 0.3 percent alcoholic extract of chamomile in drinking water. The experimental period was divided into two feeding phases, starter period (1-21 days old) and grower period (22-42 days old), and diets for each period were formulated to meet requirements recommended by NRC. All diets were fed in mash form with birds having *ad libitum* access to feed and water. Body weight gain and feed intake per pen was measured weekly throughout the experiments, and FCR was calculated on a pen weight basis. At 42 d of age, blood samples of all chicks were taken from the wing vein. At the same time, 2 chicks close to the mean replicate weight from each pen were killed by cervical dislocation and body weights, as well as weights of breast, thigh, bursa of Fabricius, thymus, spleen, liver (without gallbladder), gallbladder, pancreas, and abdominal fat pad were recorded. The results showed that feed intake, body weight gain and feed conversion ratio were not significantly affected by treatments in different stages of the experiment ( $P>0.05$ ). The use of antibiotics and alcohol extracts of Chamomile were ineffective on carcass weight, the relative weight of the liver, pancreas and abdominal fat ( $P>0.05$ ); While using the 0.2 per cent alcoholic extract of Chamomile can increase the relative weight of the thighs ( $P<0.05$ ) and gizzard ( $P<0.01$ ) respectively. No differences were found in the immune response among the experimental groups ( $P>0.05$ ). Treatments haven't significant effect on glucose, albumin, LDL- cholesterol, HDL- cholesterol and total cholesterol ( $P>0.05$ ); But triglycerides were decreased at 0.1 percent alcoholic extract of Chamomile ( $P<0.05$ ). Plasma levels of WBC, RBC and Hb is not affected by the ethanol extract of Chamomile or antibiotics ( $P>0.05$ ). These results suggest that the ethanol extract of Chamomile had no effect on growth performance and immune response of broilers.

**Keywords:** Broiler, Chamomile, Performance, Carcass traits, Immune response

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## Effects of Different Levels of Lemon Balm (*Melissa Officinalis L.*) Powder on Growth Performance and Immune System of Broiler Chickens

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This study was conducted to evaluate the effects of lemon balm powder, as an antibiotic replacement, on growth performance, immune system responses, blood metabolites and carcass characteristics of broiler chickens. The 400-day old mixed broiler chicks (Ross 308) were used in a 42 days trial based on a completely randomized design. Chicks were randomly assigned to 5 treatments, four replicates of 20 birds per pen. The treatments were: T1: basal diet (control); T2: basal diet+250 ppm of lincomycin; T3: basal diet + 1% of lemon balm powder; T4: basal diet + 2% of lemon balm powder; T5: basal diet + 3% of lemon balm powder. The experimental period was divided into two feeding phases, starter period (1-21 days old) and grower period (22-42 days old), and diets were formulated to meet requirements recommended by NRC. Body weight gain and feed intake per pen was measured week, and FCR was calculated on a pen weight basis. At 42 d of age, blood samples of all chicks were taken from the wing vein. At the same time, 2 chicks close to the mean replicate weight from each pen were killed by cervical dislocation and body weights, as well as weights of breast, thigh, bursa of Fabricius, thymus, spleen, liver (without gallbladder), gallbladder, pancreas, and abdominal fat pad were recorded. Results showed that feeding lemon balm significantly ( $P<0.05$ ) decreased feed conversion ratio and feed intake in grower period. In this period, T3 (1% of lemon balm) had the lowest FCR between treatments. Feeding lemon balm resulted a significant ( $P<0.05$ ) increase in heterophile percentage and also a significant ( $P<0.05$ ) decrease in limphosite percentage. Between carcass characteristics were measured in current experiment, only liver and pancreas had significantly ( $P<0.05$ ) higher weights respectively in treatments contained 1 and 2% of lemon balm. Other carcass characteristics include carcass percentage and weights of abdominal fat, breast, thigh, neck, back, wings, bursa, gizzard and intestines were not affected by treatments ( $P>0.05$ ). Indeed, feeding different levels of lemon balm had no significant effects on blood and plasma parameters including MCH, MCHC, WBC, and concentration of hemoglobin, albumin, total protein, cholesterol, triglyceride and glucose ( $P>0.05$ ). on the other hand, feed cost, feed cost per kg of produced meat and totally economical efficiency did not affect by treatments ( $P>0.05$ ). In conclusion, using lemon balm powder in broilers diet didn't show a considerable improvement in broiler performance and economical related parameters.

**Keywords:** Broilers, Lemon balm, Immune system, Performance, Blood metabolites

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## The Effect of *Nigella sativa* Extract on Renal Oxidative Damage in a Rat Model of Unilateral Ureteral Obstruction

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Unilateral ureteral obstruction (UUO) is one of the most important and common experimental model for pathophysiologic evaluation of obstructive nephropathy and renal fibrosis. *Nigella sativa* (NS) is a plant with many pharmacological effects. In the present study, the effect of NS aqueous-ethanolic extract against renal dysfunction and oxidative damage following UUO was evaluated. 40 male albino Wistar rats were randomly divided into 4 groups: 1- sham-operated, 2- UUO, 3- NS (200 mg/kg)+UUO, 4- NS (400 mg/kg)+UUO. 3 days after the administration of NS extract, the animals were anaesthetized. Then, the abdomen was opened with a midline abdominal incision and the left ureter was ligated with 4-0 silk at two points and was cut between the ligatures to prevent urinary tract infection. The administration of NS extract was continued two weeks after UUO. Blood sample was collected on the first and the last days of the study for assessment of serum levels of urea and creatinine. Renal concentration of malondialdehyde (MDA) and total thiol groups were evaluated in obstructed kidneys. Two weeks after UUO, there was a significant increase in serum urea and creatinine concentration compared with day 1. Serum urea concentration in NS treated groups showed no significant change compared with day 1. However, two weeks after UUO in NS 200, 400+UUO groups, serum creatinine concentration significantly decreased compared with day 1. In UUO group, MDA concentration showed a significant increase and total thiol content showed a significant decrease compared with sham group. Administration of NS extract at doses of 200 & 400 mg/kg significantly improved these parameters compared with UUO group. The current study suggests that NS extract are able to improve the UUO-induced renal dysfunction and oxidative stress.

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## Effect of Olive Oil on The Speed of Repair and Regeneration in two Species of Killifish *Aphanius dispar* and *Aphanius furcatus*

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Bony fish, along with a number of amphibians have the power to repair their wounds and organs. The incidence of wounds in humans and animals is common; hence, increasing the quality and speed of wound healing is one of the important goals of doctors and veterinarians. Therefore, there are several studies to use medicinal plants to can shorten the time of the repair process. Olive oil consists of an oleic acid that plays an important role in inflammatory responses to wound healing; its phenolic and scalene compounds have antioxidant, anti-inflammatory and antimicrobial properties. The aim of this study was to investigate the effect of olive oil on the wound healing process and cell proliferation of the fins of the two species mentioned. 16 numbers of fish specimens from each species with the body length of 4 cm were selected. Each species divided in two group of control and treated with olive oil (eight fish exposed to olive oil twice a week). Anesthetizing was done with 180 ppm clove extract solution and a about 3 mm portion of caudal fin was cut. The recovery rate for these four groups was monitored within days 3, 6 and 8. So far, the effect of olive oil on fish regeneration has not been investigated, but according to this study, in compare to the *A. furcatus*, there is a significant acceleration in caudal fin regeneration of *A. dispar* species in the olive oil group. Reducing the complications of wound healing and increasing the rate of recovery are two main research aspects of surgical science. This study will provide a way for further research into other treatments in traditional medicine of using herbal medicine. It will create a potential for the production of pharmaceutical products from the active ingredients. In the current study, other doses of olive oil are recommended for more effect on *A. furcatus* regeneration.

**Keywords:** Olive oil, Wound repair, Caudal fin, *Aphanius dispar*, *Aphanius furcatus*



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## Green Tea and Its Effect on the Regeneration of Common Tooth Carp *Aphanius furcatus*

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In traditional Iranian medicine, the use of herbal medicines is commonly used in traditional medicine sources. Research on plant growth factors that affect wound healing is one of the areas of medical progress and developmental biology. The use of plants has the advantage of being cheap and not causing side effects to fish, humans and the environment. Green tea (*Camellia sinensis*) has anti-oxidant and anti-inflammatory properties and may enhance wound healing process. The present study was aimed to examine the effect of green tea extracts on the regeneration of the *Aphanius furcatus* caudal fin. 20 numbers of fish with total range size of 3.5cm were randomly selected and anesthetized with 180 ppm clove extract solution. Thereafter, a portion of caudal fin (about 4-3mm) cut with a surgical blade. The fish were divided into two groups (10 in each group) and placed in separate 5-liter aquariums with water temperature of 20 °C; control group and green tea treated group. 50 ml essence of green tea (from 0.1% green tea extraction) was used. The regeneration rate of these two groups was observed within 12 days. Photos were taken from days 3, 6, 9 and 12. According to the study, green tea treated group in compare to the control, show increasing in the rate of cell proliferation and caudal fin regeneration. Moreover, the green tea accelerates the wound healing of cut caudal fins. Since the effect of green tea extraction on the wound healing was observed, more studies are needed to determine the role of its compounds.

**Keywords:** Green tea, Caudal fin, Wound healing, Killifish, Tooth-carp

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## Comparison between Aloe-vera and Olive Oil Effect on wound Healing and Caudal fin Regeneration of *Aphanius furcatus*

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Aloe vera is a known herb in the treatment of skin lesions in humans. This plant has growth factors and its glycoproteins cause proliferation and migration of cells. Moreover, its beta-cytosterol is an angiogenic substance that increases the rate of wound healing and the 6- mannose phosphate has anti-inflammatory properties. Olive oil stimulates the proliferation of epidermal cells through its linolenic acid. The aim of this study was to compare the effect of these two plants on the caudal fin regeneration of Killifish of *A. furcatus*. 24 fish individuals with total length of 4.5 cm were selected and after anesthetization with 180 ppm clove extraction, the caudal fins were cut and the regeneration process was investigated in three groups; control, caudal fin treated with olive oil every 48 hours after cut, and the last group which is treated with 10% Aloe-vera extraction each 48 hours for 20 minutes. The regeneration rates of caudal fin for were monitored during 12 days by taking photos from days 3, 6, 8, and 12. The result shows that Aloe-vera treated group, in compare to the other groups, increase the regeneration rate. Observation shows that the fin ray formation of caudal fin also enhanced in Aloe-vera treated group. There were not significant changes between regeneration rate of caudal fin in control and olive oil treated in this species. Using medicinal herbs such as Aloe-vera, because of being natural, has no side-effects and affordability, worth to study in detail on the aspect of regeneration.

**Keywords:** Aloe-vera, Olive oil, Regeneration, Killifish, *Aphanius furcatus*





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## Effect of Ajwain and Fennel Essence on Insulin Resistance, Blood Metabolites and Pancreatic Pathology in Male Wistar Rats that Were under Stress Induced by Dexamethasone

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The aim of this study was to investigate the impact of feeding ajwain and fennel essences on insulin resistance improvement caused by dexamethasone injection in male rats as a mammalian model. For this purpose 30 mature males Wistar rats were allocated to 5 treatments and 6 replicate each in a completely randomized design. The experimental groups were consisted of: 1-Control group (no dexamethasone injection), 2- Stress group (daily injection of dexamethasone), 3- Fennel group (daily injection of dexamethasone + feeding fennel essence), 4- Ajwain group (daily injection of dexamethasone + feeding ajwain essence) and 5- Fennel + Ajwain group (daily injection of dexamethasone + feeding fennel and ajwain essences). The daily I.M. injection of dexamethasone (1 mg/kg body weight) was performed to create stress condition. Fennel and ajwain essences and their mixture (50:50) were fed (100 mg/kg of body weight of rats) for 27 days through gavage. Fennel and ajwain essences had lower antioxidant capacity compared to BHT based the IC50 index. Our results showed that the stress condition caused pancreatic weight loss ( $P < 0.05$ ), however consumption fennel essence and the mixture of fennel and ajwain essences partially improved weight loss. Langerhans islands area was not affected by the experimental treatments. The highest and lowest glucose level ( $P < 0.05$ ) was observed in the stress group and the ajwain group, respectively. Feeding mixture of fennel and ajwain essences increased ( $P < 0.05$ ) concentration of serum insulin hormone compared to the control, stress and fennel groups. Superoxide dismutase enzyme and total antioxidant capacity were affected ( $P < 0.05$ ) by experimental treatments, in such a way that the maximum level of superoxide dismutase activity observed in control group and the minimum level was observed in stress group. Moreover, superoxide dismutase activity was significantly higher ( $P < 0.05$ ) in groups fed essences compared to the stress group. Control group had higher ( $P < 0.05$ ) serum total antioxidant capacity than the fennel group and the other groups were intermediate in this respect. It was concluded that dexamethasone injection caused incidence of diabetes and a disruption of pancreatic beta cells activity. However, feeding herbal essences (especially ajwain and the mixture of awain and fennel essences) due to their antioxidant activity could improve the stress diabetic condition in male rats.

**Keywords:** Dexamethasone, Stress, Fennel, Ajwain, Blood metabolites, Rat

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## Influence of Low, Medium and High Input Organic and Conventional Production Systems on Flowering and Yield of Saffron

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Saffron production in Iran is highly ecological towards organic farming both in terms of technology and social issues. Therefore, the aim of this study was to evaluate the effect of three organic (OPS) and conventional (CPS) production system on saffron flowering parameters. For this purpose two separate experiments were carried out at research field of University of Birjand during 2015-2017. In the first experiment the effect of three OPS (LI=low, MI=medium and HI= high input) and in the second one the effect of three CPS (LI, MI and HI) was tested. In LI, MI and HI-OPS, respectively, 15, 30 and 45 ton ha<sup>-1</sup> cow manure in the first year and 5, 10 and 15 ton ha<sup>-1</sup> in the second year was used. In addition, during both years 1, 2 and 3 times hand-weeding was used for LI, MI and HI, respectively. In LI, MI and HI-CPS, super phosphate (100, 150 and 200 kg ha<sup>-1</sup>, respectively, as pre planting only in the first year), urea (100, 150 and 200 in the first and 33, 50 and 66 kg ha<sup>-1</sup> in the second year in three dates as top dressing), chemical weed control (1, 2 and 3 times by Super-Galant in concentration of 1.5 L ha<sup>-1</sup>, during both years) and foliar nutrient application (2, 4 and 6 part per 1000 using Dalfard in both years) were used. All saffron flowering parameters improved by HI-OPS and followed by MI and LI-OPS. The highest flower yield (294 kg ha<sup>-1</sup>) and dry stigma yield (3.78 kg ha<sup>-1</sup>) were obtained when saffron field was under HI-OPS for two years. In the first flowering season there was no-significant different between three CPS in terms of all flowering indices. However, in the second flowering season MI-CPS was the best and HI-CPS was the worst treatment in terms of number and flower yield, stigma yield and petal yield. Flower and stigma yield in MI-CPS were 88 and 1.01 kg ha<sup>-1</sup> while for HI-CPS were 56 and 0.83 kg ha<sup>-1</sup>, respectively. Comparison between two production systems revealed the significant superiority of OPS, so that, mean flower yielded during two years was 45 and 137 kg ha<sup>-1</sup> for CPS and OPS, respectively. These differences in due to nutritional balance and improved soil structure under organic management [1], as well as more soil salinity at the site of CPS.

**Keywords:** Chemical Fertilizer, Corm, Cow manure, Herbicide, Stigma

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### Comparison of Three Essential Oils Antibacterial Effect Using Electrochemical and Disk Diffusion Agar Methods

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Detection of pathogen microorganisms, such as *Staphylococcus aureus* (*S. aureus*), which can be harmful for public health is so important. In this study, tried to design a simple and sensitive biosensor based on multi-walled carbon nanotubes (MWCNTs). *S. aureus* PTCC1112 was sub-cultured in tryptic soy agar (TSA) medium and incubated at 37 °C (Fig. A). 20 µL of 0.001 g of MWCNTs suspension in 1mL ethanol were spiked on the polished surface of glassy carbon electrode and dried at room temperature. Three different concentrations of *S. aureus* suspension in PBS (pH 7.4) were prepared in accordance with 0.5, 1 and 2 McFarland concentrations, which are equal to  $1.5 \times 10^8$ ,  $3.0 \times 10^8$  and  $6.0 \times 10^8$  cfu mL<sup>-1</sup>. As can be seen in the square wave voltammograms (SWVs) in Fig. B, current increased by increasing the concentration of *S. aureus* suspension. The effect of modifier on microorganism detection, scan rate ( $v_{opt}=0.05$  V s<sup>-1</sup>) and linear dynamic range ( $3.7 \times 10^6$ – $3.0 \times 10^8$  cfu mL<sup>-1</sup>) were studied by electrochemical methods. The antibacterial effect of three herbal essential oils, tea, bergamot and lemon, were compared by electrochemical and biological methods. The results of the study based on disk diffusion agar method (Fig. C (for lemon essential oil) and symmetrically by cyclic voltammetry (CV) revealed that this biosensor can be used for comparing the effectiveness tea essential oil, bergamot essential oil and lemon essential oil to inhibit the growth of bacteria. By adding the essential oils into the *S. aureus* growth media, the related currents were vanished or largely decreased. It demonstrates the anti-bacterial effect of these herbal essential oils and the ability of MWCNTs/GCE to detect the presence or absence of *S. aureus* in a few minutes.



Fig. A. Microscopic morphology of *S. aureus* (×100)

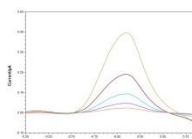


Fig. B. SWVs of increasing concentration of *S. aureus*

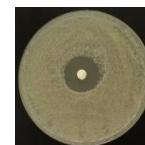


Fig. C. Inhibition zone of lemon essential oil against *S. aureus*

**Keywords:** *Staphylococcus aureus*, Antibacterial effect, Modified electrode

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### Molecular Evaluation of *icaA* Biofilm Gene Expression Level in Pathogen Strain of *Staphylococcus aureus* Treated with Garlic Extract and Ciprofloxacin

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Many microorganisms, especially *Staphylococcus aureus*, are capable of biofilm formation. Biofilm plays a key role in many infections. Biofilm is a virulence factor that acts as a barrier against antimicrobial and host immune systems and leads to colonization of bacteria. Molecular studies have shown that intercellular adhesion molecules play a role in biofilm formation. These adhesion molecules are the product of the *icaADBC* operon [1]. The formation of biofilms and antibiotic resistance has led to serious staphylococcal infections. Ciprofloxacin is an antibiotic used for a number of bacterial infections such as methicillin-sensitive *Staphylococcus aureus*. But there are several reports of *Staphylococcus aureus* resistance to ciprofloxacin. In recent years, the use of natural extracts with antimicrobial properties has been studied individually and in combination with antibiotics. Garlic (*Allium sativum*) is one of the medicinal plants that has strong antimicrobial properties and can have an inhibitory effect on the growth of a wide range of gram-positive and negative bacteria. In this study, the *icaA* biofilm gene expression level in the pathogen strain of *Staphylococcus aureus* collected from the hospital was investigated by treatment with garlic extract and ciprofloxacin antibiotic using the Real-time PCR method. According to this study, garlic extract can reduce biofilm gene expression by 61% of control samples. Ciprofloxacin also had a good effect on the expression of this gene and reduced the expression of this gene to 45%. But the combined treatment of this bacterial strain with garlic extract and ciprofloxacin resulted in a further reduction of the expression of this gene and the *icaA* biofilm gene expression level was reduced to 35%.

**Keywords:** *Staphylococcus aureus*, Biofilm, *icaA*, Ciprofloxacin, Garlic extract

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## Geometrical and Topological Studying of Venation Pattern and Mucilage Content in *Viola tricolor* under Ultraviolet (UV A; B) Radiation

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*Viola* genus contains about 500 species; widely spread all over the world. *Viola tricolor* L. (wild pansy) is considered the most important and used in traditional medicine to treat various skin conditions (eczema, acne, pruritus), bronchitis and rheumatism. Ultraviolet radiation is the non-ionizing region of the electromagnetic spectrum that comprises approximately 8%-9% of total solar radiation. Increased UV exposure has been shown to alter the biotic relationships of higher plants. The present study aims at assessing the effects of UV-(A; B) radiation in the veins topological features and mucilage content of *Viola tricolor* leaf's. In this study was presented proper protocol to transparent of leaves. According to this protocol, leaf samples were placed in 5% HCL for 6 hours and for mucilage locating was used staining by safranin. Geometric and topological description can be considered as a systematic feature. Based on the analysis that performed in the present study, a ramified structure is brochidodromous type with cycle will be termed "network" or "closed". Because redundancy in the present structure is more than one. In the treated sample redundancy has been increased that suggested the Network with a high of redundancy should be corresponding resistant to vein damage. Along with the regular patterning of the veins, mucilage cavities have been seen around the phloem. Diameter of the mucilage spaces increased in the treatment samples. In this study, a significant relationship between the vein pattern and the position and content of mucilage can be reported.

**Keywords:** *Viola tricolor*, Redundancy, Mucilage cavities

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## Migraine Cure Claim: From MigriHeal<sup>®</sup> to MigraineCut<sup>®</sup>

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Migraine as a primary headache known as a non-curable disease in all medical texts around the world [1]. This type of headache known by medium to severe intensity, affects one-half of the head, is pulsating in nature, and lasts from 4 to 72 hours. Since 1994, a group of professors and researchers of Tehran University of Medical School in cooperation with some other universities and research centers have started a comprehensive project to study migraine headaches. The main goal of the project was to develop and produce a drug for treatment of migraine patients. A set of herbal medicines are presented and discussed for migraine treatments. By a preliminary survey, tens of drug ingredients, claimed for mitigation or treatment of headaches, have been identified. After 14 years of theoretical studies, laboratory researches, and clinical trials, the project was successfully completed. As a remarkable achievement, first, MigriHeal<sup>®</sup> (IRC1228143083) a curative medicine for migraine headaches based on natural and herbal ingredients of some medicinal plants (Lavender, Melilot, Viola, Fennel, Coriander and Marjoram), has been developed. It is worthwhile to notice that MigriHeal<sup>®</sup> has been herbal powder, needed to be properly processed before use and mainly has been processed and used in pain clinics. In the last six years, the group has planned for a more user-friendly shape of the drug. Some broad R&D efforts have been successfully performed to provide the drug as nasal spray, with the name brand MigraineCut<sup>®</sup> (IRC7559424074287898). In the present study, the efficacy of MigriHeal<sup>®</sup> and MigraineCut<sup>®</sup>, two drugs with the migraine cure claim, has been investigated by measuring the severity of migraine headaches of sample population in comparison with a control group. The results indicate that the drug efficacy has been enhanced about 12 percent by making change in its dosage form.

**Keywords:** cure; efficacy; herbal medicine; migraine; MigraineCut<sup>®</sup>; MigriHeal<sup>®</sup>.

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## Ethnobotanical Study of Medicinal Plants of Khatam City of Yazd Province, Iran.

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Access to the non-documented experiences and information is one of the valuable ways for developing pharmaceutical sciences and a basis for productions of new drugs. Ethnobotany is the science of recovering endangered non-documented traditions. Protection of these traditions would be a precious guide to gain access to new drug sources. The aim of this study was to identify and introduce the ethnobotany of Khatam city in Yazd province, Iran. Traditional knowledge and beliefs of ethnic groups were documented using a questionnaire and by interview. Documentary studies of medical and pharmaceutical sources and identification and scientific nomination of medicinal plants were done. Ethnobotanic information of the plants was recorded and some of the plants were used for phytochemical studies. The presence of 76 plant species belonging to 34 plant families was proved. Lamiaceae (12 taxon), Asteraceae (10 taxon) and Apiaceae (10 taxon) constituted the major medicinal flora of the region. The most use of the plants was in gastrointestinal, respiratory, urinary, diabetic and cholesterol disorders, respectively. Considering the originality of this region, using our findings can design appropriate programs for developing the medicinal plants compatible with the ecological conditions of this region.

**Keywords:** Ethnobotany, Medicinal plants, Yazd

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## The Comparison Between three Types of Super Absorbent Polymers on Some Morphophysiological Characteristics of (*Ocimum basilicum* cv. Keshkeni luvellou) Under Salinity Stress

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Salinity stress is one of the main factors that limited crop production. Salt stress can cause physiological effects by decreasing soil water potential [1]. Super absorbent polymers are hydrocarbon compounds and water holder that they do not have any pollution effects on soil, water and plant tissues [2]. Basil (*Ocimum basilicum*) is a medicinal plant from Lamiaceae family that used in food and cosmetic industries. In order to study the effect of three types of super absorbent polymers on some morphological characteristics, photosynthetic pigments, proline and malondialdehyde (MDA) content of *Ocimum basilicum* cv. Keshkeni luvellou under salinity stress, an pot experiment was conducted as factorial based on completely randomized design with three levels of salinity (0, 40 and 80 mM NaCl) in irrigation water and three types of super absorbent polymers on four levels (control, Ackoasorb, Stockosorb and Terracottem) in three replications in 2017. The highest amount of leaf fresh and dry weight, plant height and stem diameter were observed in the treatment without salinity and application of Terracottem. The maximum amount of proline and malondialdehyde were observed at 80 mM NaCl and application of Terracottem. So, super absorbent polymers (especially Terracottem in this research) with water absorption and ion maintenance can improve plant growth by relieving oxidative stress and regulating of osmolites under stress conditions.

**Keywords:** Basil, Super absorbent polymer, Proline, MDA, Photosynthetic pigments

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## Effect of Different Girdling Times on Fruit Retention and Quality, Total Chlorophyll and Carotenoid in Barberry Plant

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Seedless barberry (*B. vulgaris* L.) is an important horticulture species, which its red berries is used for different purpose including diet, medicine and so on. Fruitlet abscission and late colour change are seen in barberry orchard that is not positive characteristics. Thus, different shoots of tree were girdled to a 2 mm width in early May and early September, 2016 and 2017. Data showed that girdling promoted a significant increase in total chlorophyll in September, however carotenoid content declined, compared to control that was disagreement with Schechter et al (1994) on apple. Girdled tree, in May showed low number of matured fruits. It was shown that the amount of total soluble solids increased at harvest time in the girdled trees compared to non-girdled trees. Increased fruit set may be due to the decrease in fruit drop that was in agreement with reports on persimmon (Hasegawa, Matsushita, & Kitajima, 2000; Hodgson, 1938) and citrus (Rivas et al., 2006; Mataa, Tominaga, & Kozaki, 1998). Finally, girdling at beginning of fruit color change (early September) showed a better effect on fruit quality, compared with others.

**Keywords:** Fruit set, Ringing, Seedless barberry, Total soluble solids

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## Virtual Screening of Henna Compounds Library for Discovery of New Leads against Human Thymidine Phosphorylase, an Overexpressed Factor of Hand-Foot Syndrome

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Capecitabine is one of the most effective and successful drugs for the treatment of uterine and colorectal cancer which has been limited in use due to occurrence of hand-foot syndrome (HFS). Overexpression of human thymidine phosphorylase enzyme is predicted to be one of the main causes of this syndrome. Thymidine phosphorylase enzyme is involved in many cancers and inflammatory diseases and Pyrimidine nucleoside phosphorylase family is found in a variety of organisms. Results of clinical studies have shown that topical usage of henna plant (*Lawsonia inermis* from the family of Lythraceae) could reduce the severity of HFS. By using *in silico* methods on reported compounds of henna, the present study is aimed at finding phytochemicals and chemical groups with the potential to efficiently interact with and inhibit human thymidine phosphorylase. Various compounds (825) of henna from different chemical groups (138) were virtually screened by the interface to Autodock in YASARA Software package, against the enzyme structure obtained from X-ray crystallography and refined by homology modeling methods. Finally, diosmetin-3'-O-β-D-glucopyranoside (#219) and mono-glycosylated naphthalene were respectively selected as the most potent phytochemicals and chemical groups. Flavonoid-like compounds with appropriate interaction energy were also considered as the most probable inhibitors. More investigations on henna compounds, are needed in order to approve their effectiveness and also to explore more anti-cancer, anti-inflammatory, anti-angiogenesis and even antibiotics.

**Keywords:** Hand-Foot Syndrome, Phosphorylase inhibitors, *Lawsonia inermis* phytochemicals

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## Effect of Different K/Ca Ration on Dry and Wet Weight and Phytochemical Characteristics of *Physalis Alkekengi* Grown in Hydroponic

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*Physalis alkekengi* (ground cherry) is an indigenous herb in Iran and many other regions in the world. In Iranian herbal medicine, the plant extract has been used for treatment of wide range of diseases including difficult urination, kidney and bladder stone, febrile diseases, inflammation, constipation, general edema, arthritis and rheumatism. Chemical studies have demonstrated the presence of physalin, citric acid and vitamin C as the major compounds of the extract of *P. alkekengi*. In folk medicine, it is also claimed that *P. alkekengi* exhibits the contraceptive and abortive effect. Nutrient availability for plant growth is an important factor influencing primary production and the nutritional quality. Plant nutritionists have identified Potassium (K) as the only monovalent cation essential for all higher plants. It is the most abundant cation in plant tissues and plays a major role in various physiological and biochemical processes, including photosynthesis. Calcium (Ca), an essential macronutrient, plays a decisive role in the maintenance of cell membrane integrity and membrane permeability. In the present study, the effect of six K/Ca ratios (4:4, 5:2, 6:3, 6:4, 8:3 and 10:2) on dry and wet weight, total soluble solids (TSS), vitamin C content and electrical conductivity (EC) of *P. alkekengi* grown in hydroponic were investigated. The results show that the highest fruit fresh and dry weight (325.96 and 15 g/per plant, respectively) were found in 8:3 K/Ca ratio and the lowest fresh and dry weight (269.62 and 8 g/per plant, K/Ca ratio ) were found in 10:2 K/Ca ratio. The content of medicinal components in the *P. alkekengi* was significantly influenced by the K/Ca ratio in the nutrient solution. According to the results, the highest (12.8) and lowest (10.1) level of TSS was observed in 8:3 and 6:4 K/Ca ratio, respectively. Based on data, high (3.37 mg/FW) and low (2.22 mg/FW) vitamin C content were reached in 4:4 and 6:3 K/Ca ratio, respectively. the effect of different K:Ca ratio on EC of ground cherry fruit juice was significant.

**Keywords:** Macro element, Vitamin C, Total soluble solid, Ground cherry

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## The Effect of Different Drying Methods in Maintaining the Quality of Saffron *Crocus sativus L.*

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Saffron with the name of *Crocus sativus L.* Herbaceous plant, It is a lily of the valley. This plant has been cultivated in Asia for centuries as an aromatic and colorful spice. Saffron is used as a sedative, antispasmodic, antispasmodic, and gastric tincture. Furthermore, Due to its taste, its specific smell and yellow color are used extensively in foods, confectionery, pharmaceuticals and other industries. One of the effective factors in maintaining the quality of saffron is the method of drying the sprouts of this plant after harvest. This research was conducted to evaluate the effect of different methods of drying on preservation of saffron quality in a randomized block design with 6 replications. In this study, saffron was subjected to dehumidification with three different methods including traditional Iranian method, sieve and heater, and electric oven. Then, the color, aroma, odor and taste were determined by spectrophotometric method. Data analysis showed that there is a significant difference between the quality characteristics of dried saffron with the above mentioned methods at 1% level. The traits were better maintained during drying with an electric oven. The Spanish method, and the traditional method of Iran, are in the next stages. Due to the undesirable effects of the traditional method of drying saffron in Iran, it is recommended that in low production volume, Spanish way And if production is significant Use appropriate industrial dryers for drying saffron.

**Keywords:** Saffron, Drying methods and quality.

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## Study of Some Morphological and Biochemical Characteristics of Hyssop Plant under the Influence of Sodium Nitroprusside

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Hyssop (*Hyssopus officinalis*) is one of the most important Medicinal Plant worldwide and in Iran. A CRD-based factorial experiment was conducted to evaluate the effect of sodium nitroprusside on morphological and biochemical characteristics of Hyssop plant with 10 replications. Sodium nitroprusside was used 5 concentrations (0 (control), 50, 100, 150 and 200) micro-liters. Sodium nitroprusside commonly was used as nitric oxide (NO) donor in plants. The application of sodium nitroprusside had a positive and significant effect on number of traits, total fresh weight, vine weight and height of the Hyssop plant. The concentration of nitric oxide (150  $\mu$ L) was showed the highest and control treatment of the least change in these traits. Increasing sodium nitroprusside concentration increased up to 100  $\mu$ L of fresh root weight in Hyssop plant. However, with increasing concentration of treatment, root fresh weight decreased significantly which led to the unnecessary reduction of this trait. Also, the results showed that with increasing the concentration of snp, the total dry weight, stem dry weight and root dry weight increased insignificantly. The least traits were observed in control treatment and the highest amount was observed in the concentrations of 200, 200 and 50  $\mu$ L. Investigating the role of nitric oxide on the activity of Ascorbate peroxidase (APX), catalase (CAT), guaiacol peroxidase (gPOX) and polyphenol oxidase (PPO) antioxidant enzymes in Hyssop plant, significant increase in enzymes activity of CAT, gPOX and PPO and significant decrease in APX enzyme activity was observed. Regression analysis showed a positive and significant correlation between leaf number, total fresh weight, stem fresh weight, total dry weight, stem dry weight, root dry weight, catalase enzyme, polyphenol oxidase enzyme, guaiacol peroxidase enzyme, height and showed a negative and significant linear relationship between root fresh weight and ascorbic acid peroxidase enzymes with different levels of sodium nitroprusside. In general, the results of the measurements showed that different concentrations of SNP had different effects on the traits measured in the Hyssop plant.

**Keywords:** *Hyssopus officinalis*, Sodium nitroprusside, Antioxidant enzymes

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## Investigation on Phytochemical Constituents in Aerial Parts of Two Different *Cuscuta* Species

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The genus *Cuscuta* comprises about 170 seed-bearing parasitic species out of which 18 species are spread in different regions of Iran. These species absorb the nutrients from xylem and phloem of their parasitizing host via the haustorium. *Cuscuta* species has a wide range of therapeutic properties and can be used as a dietary nutritional supplement to promote human health. The main objective of the present study was to investigate on antioxidant activity and phytochemical compounds of two different *Cuscuta* species. Aerial parts of *C. approximata* and *C. campestris* were collected from chamomile (*Matricaria chamomilla* L.) and fennel (*Foeniculum vulgare* Mill.), respectively at research farm of Jahrom University in June, 2016. Metanolic extract of coarsely powdered aerial parts of both *Cuscuta* species were exploited for the phytochemical analysis. Based on the results, there were significant differences between the two *Cuscuta* species in terms of the investigated traits. *C. approximata* had significantly much more antioxidant activity (IC<sub>50</sub>= 88.1 vs. 45.3 mg/lit), total phenolics (60.9 vs. 31.7 mg/g), total flavonoids (109.4 vs. 69.4 mg/g), total carbohydrates (273.2 vs. 176.4 mg/g) and tannins (2.3 vs. 1.6 mg/g) content compared to that of *C. campestris*. Higher antioxidant activity of *C. approximata* can be attributed to its higher phenolic and flavonoid contents [3]. The superiority of *C. approximata* over *C. campestris* in terms of the measured traits may be related to intrinsic ability of this species and/or to metabolite profiles of its host plant.

**Keywords:** Antioxidant activity, Host plant, Haustorium, Metanolic extract

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## Effect of Deficit Irrigation on Some Phytochemicals and Essential Oil Constituents of Peppermint *Mentha piperita* L. in Warm Climate

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Peppermint (*Mentha piperita* L.) is an essential oil bearing plant which has remarkable medicinal properties. The aim of present research was to evaluate effects of deficit irrigation on some phytochemicals and essential oil constituents of peppermint in a warm climate. A RCBD experiment with three replications was carried out in research farm of Jahrom University, Jahrom, Iran. Peppermint rhizomes were cultivated in March and the plants were harvested in July, 2016. Control plots received water adequately (i.e. 30 lit/m<sup>2</sup> one day interval) through entire experimental period. At 60 days after planting, irrigation was suppressed for deficit irrigated plots to half of that of control (i.e. 15 lit/m<sup>2</sup> one day interval). Based on the results, deficit irrigated plants had significantly less amount of total phenolics, flavonoids, carbohydrates, carotenoids and antioxidant activity while more amount of proline, chlorophyll (a+b) and essential oil yield compared to that of control plants. Furthermore, menthol was decreased and menthone and menthofuran were increased in response to deficit irrigation. The reasons underlying these observations are probably the fact that monthly pan evaporation (98.8 vs. 381.5 mm) and the average monthly temperature (13.4 vs 32.0 °C) were continuously and severely increased from cultivation to harvest time. Therefore, it seems that deficit irrigated plants encountered severe water stress at harvest time. Since peppermint is not drought tolerant, its phenolics, flavonoids and antioxidant capacity would decrease and menthol dehydrogenase genes would be down-regulated in response to severe drought stress. It can be concluded that application of deficit irrigation may increase the quantity but would decrease the quality of essential oils in peppermint under warm climates.

**Keywords:** Antioxidant activity, Drought stress, Menthol

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## A Comparative Molecular Networking Study on Different Iranian *Crocus* Autumn Species Using High-Resolution Mass Spectrometry

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Saffron (*Crocus sativus* L.) is a sustainable substitute crop growing in Iran and some of its neighboring countries has many benefits. Nevertheless, the variation in the metabolite profiling among Iranian wild saffron specie has been reported. In our present report, the metabolite content of Saffron (*Crocus sativus*) and the other five autumn *Crocus* species including *Crocus caspius*, *Crocus speciosus*, *Crocus pallasii*, *Crocus cancellatus*, and *Crocus gilanicus* were studied. LC-UV-QTOF as high-resolution mass spectrometry systems was conducted to dereplicate Saffron known metabolites including Crocins, Crocetin, Safranal and Picrocroins by a molecular networking based technique. Eventually the generated data were annotated using a molecular networking procedure and revealed the dereplication of Crocins as the main saffron colorant in wild species of Saffron while Picrocrocin and Safranal were not detected.

**Keywords:** Saffron, Crocins, Molecular Networking, MS/MS

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## Extraction of the Metabolic Content of Chicory Distillate Followed by Their Identification Using LC-UV-QTOF

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Chicory distillate is the most common herbal product use in the country. Regarding the low metabolic content of this product, standardization and quality control seem very difficult. The aim of this study was to investigate the content of this herbal distillate, isolate and identify its metabolites by extraction techniques and chromatography [1,2]. HPLC-DAD and LC-UV-QTOF analysis showed that there are some sesquiterpene lactones in the metabolic content of this herbal distillate including dihydro-lactucopicrin oxalate, dihydro-lactucopicrin, Lactucopicrin.

**Keywords:** Chicory distillate, Sesquiterene, LC-UV-QTOF

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## Extraction, Identification and Purification of Some Iranian Saffron's (*Crocus Sativus*) Petals Metabolites

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Every year, in saffron harvesting process (*Crocus sativus*), other parts of this plant, like stamens and petals, are disposed as waste products. The petals of this plant consist of some valuable metabolites such as flavonoids and anthocyanins which have exhibited various promising biological properties. Pharmacological characteristics, comprising of antioxidant, anti-inflammatory, neuroprotective effect and cancer prevention were reported *previously*. Therefore extraction of such valuable metabolites from these waste products could result in high added value. In this study, two types of different extraction methods, maceration and sonication, were applied. In order to optimize the purification process, liquid-liquid extractions following column chromatography by using different resins were done. High-performance liquid chromatography hyphenated with tandem mass spectrometry (LC/MSMS), matrix-assisted laser desorption/ionization (MALDI) and extensive spectroscopic methods including 1D (<sup>1</sup>H-NMR) and 2D-NMR (COSY, HSQC and HMBC) were used to investigate the *metabolite* profile of saffron petals and identification their constituents. Finally, Comparative evaluation of anticholinesterase and antioxidant potential of crude extract and its fractions, were performed.

**Keywords:** *Crocus sativus*, Saffron, Anthocyanins, Anti - Alzheimer, LC/MSMS

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## Comparison of the Effects of Aloe Vera Gel and Zinc Oxide Ointment on Diaper Rash in Children

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Diaper dermatitis is a common skin disorder that causes restlessness in children and nursing infants are parental anxiety. Because of the high prevalence and complications of diaper dermatitis and due to the problems caused by the consumption of synthetic drugs, treatment with herbal medicines can be a useful treatment strategy. To compare the effect of aloe vera gel and zinc oxide ointment on improving diaper dermatitis in children 18-6 months referred to health centers Firozabad city 1395-1396. This study is a single-blind randomized clinical trial on 40 children 6-18 months referred to health centers Firozabad city, was carried out (1395-1396). Children were randomly assigned to two groups of consumers aloe vera gel and zinc oxide ointment, were recommended drugs used for three days. After three days to evaluate the incidence of adverse events were referred to the clinic and the incidence of infectious dermatitis, allergic or other new problems were re-examined and the absence of any problems, patients continued to use zinc oxide or aloe vera gel. Then on the seventh day the severity of dermatitis by the help of investigator (physician), who was unaware of the type of treatment, according to diaper dermatitis five-point scale, was recorded. Data using SPSS software, chi-square test, independent t-test were analyzed. The extent and severity of diaper dermatitis one week before and immediately after the intervention in aloe vera gel and zinc oxide ointment, there was no statistically significant difference ( $p > 0.05$ ). According to Wilcoxon test, dermatitis severity and extent of 3/45 to 1/7 and from 3/40 to 1/6 dermatitis decreased. Studies have shown that aloe vera gel and zinc oxide ointment impact on the improvement of diaper dermatitis is the same, it is suggested that due to the availability of aloe vera gel in the treatment of diaper dermatitis used.

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## Determination of Total Flavonoid Content of *Malva Neglecta* Extract and Its Antioxidant Activity

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*Malva neglecta*'s flowers were collected in summer 1394 from damavand region collection and named by Islamic Azad University's herbarium, Pharmaceutical Sciences Branch scientific and the Malvaceae family were identified. Extraction methods were Soxhlet and maceration with ethanol 70 degrees. The extract showed that tests of standard phytochemical for evaluation of active components such as flavonoids was carried out. The measurement of the flavonoids of the colorimetric method and at the end of the antioxidant activity by 2, 2-diphenyl-1-picrylhydrazyl (DPPH) based on the inhibition Percent of free radical was investigated. The results of Phytochemical studies showed that both ethanol extract obtained from the extraction method of this plant contains alkaloids, saponins, phytosterols, flavonoids, carbohydrates and lacking phenol and tannin. The flavonoids of the Soxhlet's extract ( $0/355 \pm 0/003$ ) and the maceration's extracts ( $0/375 \pm 0/003$ ) Mg per gram of extract was calculated. Finally the scavenging percent of free radicals for different concentrations of the standard substance, Soxhlet's and maceration's extracts was calculated. Can be concluded that both extracts Phytochemical studies are quite similar. the total flavonoids and the scavenging of free radicals extract by maceration method to account for a higher percentage.

**Keywords:** *Malva neglecta*, Phytochemistry, Flavonoids, Antioxidants





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## Induce Molting Procedures by *Portulaca Oleracea* Powder, White Button Mushroom Residual and Sunflower Seed Hulls in Responses to Laying Hens

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The present study was conducted to investigate the effects of Purslane herb, mushroom residual and Sunflower seed hulls on body weight, days to lay cessation, age to reach target weight and return to production in 252 Hy-Line W-36 of laying hens at 78 weeks of ages. Experiment was arranged in a completely randomized design (CRD) including 7 treatments, 6 replicates cages and 6 birds in each. Treatments including: feed removal (control), basal diet (diets were formulated with corn and soy bean meal in according Hy-Line international recommendation 2014) + 30% sunflower seed hulls + 2% Purslane herb powder, basal diet + 2% Purslane herb powder, basal diet + 30% sunflower seed hulls + 2% white button mushroom residual, basal diet + 2% white button mushroom residual, basal diet + 30% sunflower seed hulls and basal diet. The results have indicated target weight (30% weight loss) was achieved by treatment feed removal faster than other treatments ( $P < 0.0001$ ). Stop egg production was shown by feed removal hens ( $P < 0.0001$ ). There were no significant effect on initial weight, body loss weight in day 15 by treatment. Layers submitted to feed removal during the induced-molting period presented higher loss weight in day 6 compared treatments 2,3,4 and 5 ( $p < 0.05$ ). The early day returned to egg-laying have shown by treatments 4 and 5 ( $P < 0.0001$ ). The has been reported that *Portulaca oleracea* have effects on potential anti-obesity and reduced body weight gain. *Portulaca Oleracea* has proved to possess anti-ovulatory and estrogenic activity, Therefore it could be used for molting. White button mushroom by reducing the activity of aromatase could suppress estrogen product. It was concluded that the supplementation with white button mushroom residual was molting method alternative to feed fasting were effective to induce molting in layer hens.

**Keywords:** Laying Hens, Molting, *Portulaca Oleracea* Powder, White Button Mushroom

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## Effect of Chicken Manure on Antioxidant Activity and Secondary Metabolites of Saffron (*Crocus sativus* L.)

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The effects of applications of chicken manure on quantitative and qualitative characteristics of saffron (*Crocus sativus* L.) were evaluated under field conditions. Treatments were 4 levels of chicken manure (0, 5, 10 and 15 t.ha<sup>-1</sup>). The experiment was designed in randomized block design with three replications at the Research station of Faculty of Agriculture University of Birjand during growing season of 2015. The main secondary metabolites saffron (crocin, picrocrocin and safranal), antocyanin and total phenol were influenced by chicken manure treatments. The highest total phenol (9.078 mg.100g dry weight<sup>-1</sup>) and antocyanin (26.70 mg.100g dry weight<sup>-1</sup>) were obtained in plants treated with 5 t.ha<sup>-1</sup> of chicken manure. But, no significant difference was found in antioxidant activity under chicken manure treatments. The highest crocin (86.24%), picrocrocin (65.53%) and safranal (29.92%) were obtained in plants treated with 15, 10 and 5 t.ha<sup>-1</sup> chicken manure, respectively using these treatments caused 57 and 29 % increase compared to control. but there was no significant difference between 5, 10 and 15 t.ha<sup>-1</sup> chicken manure. Generally, the findings of current study revealed that the use of 5 ton ha<sup>-1</sup> chicken manure had strong impact on qualitative characteristics of saffron in this study.

**Keywords:** Antioxidant Activity, Crocin, Organic Fertilizer, Picrocrocin, Saffron

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- [2] Amiri, M. E. *American-Eurasian Journal of Agriculture and Environmental Science*, **2008**, *4*: 274-279.





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## Effects of Different Humic Acid Levels and Planting Density on Antioxidant Activities and Active Ingredients of Saffron (*Crocus sativus* L.)

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The effects of applications of humic acid and planting density on antioxidant activities and components of saffron were evaluated under field conditions. Treatments were of four levels of humic acid (0, 5, 10 and 15 Kg.ha<sup>-1</sup>) and three densities planting (50, 75 and 100 corms.m<sup>-2</sup>). The experiment was designed in randomized block design with three replications at the Research station of Faculty of Agriculture University of Birjand during growing season of 2015. Petal antioxidant compounds (antioxidan, total phenol and Anthocyanins) and active ingredients of saffron (picrocin, safranal and crocin) were influenced by humic acid and planting density treatments. The highest antioxidant activity (69.7%) was obtained in plants treated with 5 kg.ha<sup>-1</sup> humic acid planting density of 50 corms.m<sup>-2</sup>. But, no significant difference was found in phenol content under different treatments. The highest anthocyanin content (46.4 mg.100 gr<sup>-1</sup>) was observed in 10 kg.ha<sup>-1</sup> humic acid planting density of 75 corms.m<sup>-2</sup>. Picrocin content was influenced in response to humic acid planting density and the highest value (40.60%) was obtained from 15 kg.ha<sup>-1</sup> humic acid planting density of 75 corms.m<sup>-2</sup>. The highest safranal (20.1%) and crocin (55.57%) were obtained in plants treated with 10 kg.ha<sup>-1</sup> acid humic, while the lowest values were recorded in the control (15.70%) and (43.12%) respectively. Thus, results showed that humic acid and planting density have strong impact on antioxidant compounds and active ingredients of saffron under field conditions.

**Keywords:** Organic fertilizers, Quality performance, Plant spacing

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## Evaluation of Mizaj (Temperament) in the Patients of Metabolic Syndrome and Effect of *Crocus Sativus* (Saffron) and *Berberis Vulgaris* (Barberry Fruit).

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The metabolic syndrome is associated with increased risks of cardiovascular diseases and diabetes mellitus. The age-adjusted prevalence of the metabolic syndrome in the United States is 34% for men and 35% for women (1). Motivated by the emerging alternative medicine worldwide. In Persian Medicine (PM) every thing has its own unique temperament (Mizaj) hence reacts to various internal and external stimuli, for example: drug, climate, food, emotions, body reactions etc(2). differently according to temperament he or she possess. Thus Mizaj plays an important role in assisting specific treatment to the patient of any disease. this study aimed to evaluate the efficacy of *Crocus sativus* (Saffron) and *Berberis Vulgaris* (barberry fruit) in treatment of metabolic syndrome. This is a randomized, placebo controlled, single-blind, efficacy trial with three treatment arms (NCT01625442). A total of 77 patients with metabolic syndrome were randomly assigned to receive barberry juice, saffron juice, or placebo tablets. After obtaining informed consent from individuals, clinical examinations including height, weight, waist circumference and blood pressure were performed as well as a blood sample was taken after 12 hours of fasting and factors fasting blood sugar, serum total cholesterol, serum triglyceride, serum HDL cholesterol, serum LDL cholesterol were measured and recorded before and after 45 days of treatment. After collecting and entering data into SPSS software (version 22). Data were analyzed by chi-square, fisher's exact, paired t-test and independent t test at  $\alpha \leq 0.05$ . It was observed that the majority of patients (n=68; 88.31%) had cold mizaj while others (n=9; 11.69%) were of warm mizaj. In saffron and placebo groups, serum total cholesterol and LDL cholesterol levels decreased significantly compared with pre-treatment values (P<0.001). In the barberry group, there was no significant decrease in serum total cholesterol and LDL cholesterol levels; rather, these parameters increased significantly. Treatment with barberry resulted in no improvement in metabolic syndrome components. These findings suggest that metabolic syndrome is likely to be predisposed by cold su' mizaj (clinical features of abnormal Temperament). Our study suggests that saffron and positive suggestion have ameliorating effects on metabolic syndrome. Also, we observed deteriorating effect of barberry on metabolic syndrome. Because saffron is warm mizaj and barberry cold mizaj, We propose this negative effect as a clinical clue to confirm the principle of temperament correction of Traditional Persian Medicine. Comprehensive scholarly-planned clinicopathological studies on this principle would have promising results.

**Keywords:** Metabolic Syndrome, Crocus, Berberis, mizaj, temperament, Persian Medicine (PM)



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### Germaconalide Sesquiterpene Lactones from *Tanacetum sonbolii*

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*Tanacetum* is a genus of about 200 species of flowering plants in the family, Asteraceae. The genus is native to many regions of the northern hemisphere and includes several strongly scented annual and perennial species [1]. It is represented by 36 species in Iran, where 16 of them are endemic [2]. Phytochemical investigation on extracts from the flowers and the aerial part of *Tanacetum sonbolii* an endemic species of Iran was carried out by normal and reverse phase column chromatography and afforded two new germaconalide sesquiterpene lactones. Structures were elucidated by means of 1D and 2D NMR spectroscopy and HRMS. The absolute configuration of the compounds was confirmed by combination of experimental and *in silico* based calculation of electronic circular dichroism (ECD) spectroscopy.

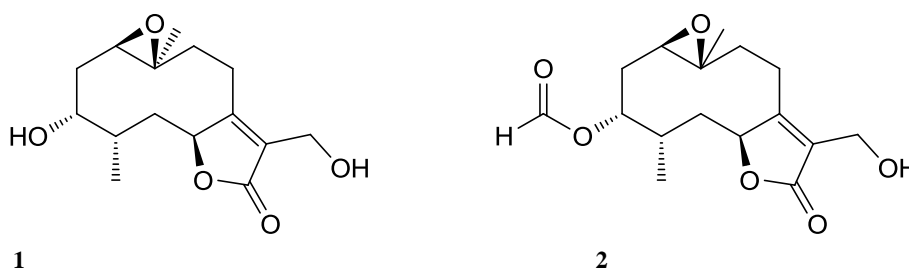


Fig. 1: Structures of compounds

**Keywords:** *Tanacetum sonbolii*, Sesquiterpene lactone, ECD

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### Effect of Ration Containing *Stachys lavandulifolia* Extract on Growth and Immune Factors, Carcass Quality, Intestinal Structure and Acute Stress Response in Common Carp (*Cyprinus carpio*)

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Today, the spread of diseases is one of the major problems in aquaculture. Antibiotics are generally used to prevent the spread of diseases in fish, as well as to stimulate growth and increase food efficiency. Due to some of the disadvantages of using antibiotics, such as increasing bacterial resistance and reducing the effectiveness of antibiotics and public health problems, the use of natural substances stimulates the immune system. Immune system stimulants, in addition to increasing the immunity of fish, have a positive effect on growth, feed conversion ratio and chemical composition of fish carcasses. Therefore, to assess the effects of mountain tea on growth parameters (including final weight, specific growth factor, condition factor, weight gain and feed conversion ratio), The chemical composition of carcass (including protein, moisture and fat), intestinal tissue and response to stress on common carp, 1600 fish were randomly divided into four groups (each treatment was three replicates). Treatments 1 as control (fed with base rations), Treatments 2, 3 and 4 were fed diets containing mountain tea extract of 3, 6 and 9% for 60 days, respectively. Based on the results, final weight, feed conversion ratio, weight and weight index were increased in treatments containing mountain tea extract, but there was no significant difference ( $P > 0.05$ ). There was a significant difference in hemoglobin, hematocrit, and white and red cells between control and 9% ( $P < 0.05$ ). After severe stress induction, white and red cells increased 9% in treatment than control treatment. Hemoglobin levels also showed a significant difference in 9% treatment. No significant difference was found in the chemical composition of fish carcasses. According to the results of intestinal histology, the highest folding length was observed in 9% treatment, which was significantly different from that of control ( $P < 0.05$ ). The final results show the beneficial effects of mountain tea extract on immunological factors, digestive system and somewhat stress response in fish fed diets containing mountain tea extract compared to control group.

**Keywords:** *Stachys lavandulifolia*, Common carp, Growth and Immune factors, Stress

**References:** [1] Asadi, M.; *Effect of hydroalcoholic extract of mountain tea on Prosthesis Leishmaniasis*, University of Medical Sciences. **2011**, Vol 4, pp. 284-279.



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## Evaluation of Anticancer Activity and Lymphocytes Proliferation Induction of Steam and Leave Extracts of *Urtica*

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Regarding the presence of many active biological constituents in *Urtica*, the present investigation was carried out to evaluate anticancer activity and lymphocytes proliferation induction of steam and leave extracts of *Urtica*. *Urtica* is a genus of flowering plants in the family Urticaceae. Many species have stinging hairs and may be called nettles or stinging nettles, although the latter name applies particularly to *Urtica dioica*. *Urtica* has been widely used as a traditional medicine for around a thousand years. Methanol extracts of the steam and leave of *Urtica* were prepared. The effect of steam and leave extracts of *Urtica* on MCF7 proliferation was measured using MTT assay at different concentrations (125, 250, 500 and 1000 µg/ml). Also, the effect of steam and leave extracts of *Urtica* on lymphocytes proliferation Induction was measured using MTT assay at different concentrations (125, 250, 500 and 1000 µg/ml). The results showed that leaf of *Urtica* has most potent cytotoxic activity against MCF7 cells, 77% inhibition in a dose 500 µm/ml while leaf of *Urtica* induces highest lymphocytes proliferation (160%) in a dose 500 µm/ml. In conclusion, the results indicated that *Urtica* might be good candidates against breast cancer cells. In addition, *Urtica* can induce lymphocytes proliferation that can strengthen the immune system.

**Keywords:** *Urtica*, Anticancer activity, Lymphocytes proliferation, MTT assay

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## Efficacy of Nanoemulsion of *Mentha longifolia* Essential Oil on *Ephestia kuehniella* (Pyralidae)

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*Ephestia kuehniella* Zeller (Pyralidae) is one of the most important pests of flour mills in temperate climates [1]. Moth larva can decrease the quality and quantity of food-stuffs by feeding, webbing and fecal material [2]. Due to the many problems related to chemical pesticides effects, the essential oils (EOs) are recently considered to control insect pests. However, it is necessary to be formulate before using. In this study, the effect of nanoemulsion produced using new technique on toxicity and durability of *Mentha longifolia* L. (Lamiaceae) essential oil against 5<sup>th</sup> instar larva of *E. kuehniella* has been investigated. Fumigant toxicity of EO was approximately more than nanoemulsion in first 24 hours after being experiment. But, durability and fumigant toxicity of nanoemulsion in the long term was so higher than non-formulated EO. The LT<sub>50</sub> values of EO and nanoemulsion at 1111.1 µl/l (LC<sub>80</sub>) achieved from fumigant toxicity bioassay was respectively 3.69 and 15.18 days. At 413.7 µl/l (LC<sub>50</sub>) the EO had no durability, but the LT<sub>50</sub> of nanoemulsion was 11.45 days. The main reason for the long-term perdurability of nanoemulsion is controlled release of EO as active ingredient. Therefore, this technique is hopefully expected to overcome the limitations of EOs to control of stored product pests and can be used in integrated pest management (IPM).

**Keywords:** *Ephestia kuehniella*, Essential oil, Fumigant toxicity, *Mentha longifolia*

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## Leaf and Flower Morphology of *Geranium* in Iran

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Morphology and micromorphology (sepal, petal, trichome of flower and leaf shape) 32 accessions from of 13 taxa of *Geranium*, representing the three sections of the genus represented in Iran (*G. sect. Dissecta*, *Geranium*, and *Tuberosa* of subgen. *Geranium*), that were collected from different habitats in Iran, was examined using stereomicroscopy and scanning electron microscopy (SEM). The biometric study involved 14 quantitative and 19 qualitative characters. Statistical analysis employed PAST software. Principal Component Analysis defined the most variable characters. Diagnostic features are presence of petal and sepal shape, type of trichome in pedicle and sepal, hair density, leaf shape, petal apex, length of petal and leaf. In general, the present study revealed that the species could be differentiated by morphological characters. These characters were found useful for the taxonomic delimitation as all the taxa clearly distinguished at the section, specific as well as at the infraspecific level.

**Keywords:** *Geranium*, Morphology, Micromorphology, Iran

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## Effect of Application of Azotobacter and Mycorrhizal Biofertilizers on Quantitative and Qualitative Yield of Lemon Balm (*Melissa officinalis*).

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Lemon Balm (*Melissa officinalis*) is a medicinal plant that is widely used in the food, pharmaceutical, cosmetics and perfumery industries. The importance of organic production of medicinal plants, reducing of using chemical fertilizers, and the necessity of increasing quantity and quality production in order to optimize the economic production and increase, clears the necessity of using biological fertilizers in medicinal plants production. In order to investigate the effect of mycorrhiza and azotobacter biofertilizers on quantitative and qualitative yield of lemon balm, an experiment was conducted in a randomized complete block design. The treatments intended for testing included biological fertilizer containing azotobacter, biological fertilizer containing mycorrhiza and control with three replicates for each treatment. Plants were planted in greenhouse trays in 2016 winter and transferred to the field after reaching the four-leaf stage. The application of azotobacter Fertilizer (Dr.Bio) conducted as seed inoculation at seeding stage, and Mycorrhizal fertilizer (Biomplus-MABCO) was used in soil with sawdust (as carrier) when cultivated in the main plot. The plants were irrigated until flowering stage on a regular basis every three days and harvested at flowering stage. Quantitative and qualitative factors including plant fresh weight, plant dry weight, plant height, number of leaves per plant, area of 10 main leaves and essential oil percentage were measured and analyzed by SPSS software. The results of the experiment showed that the application of biological fertilizers in all measured factors was significantly different from the control at LSD 5%. However, there was no significant difference between the treatment of mycorrhiza and Azotobacter in all the factors except essential oil content. There was no significant difference between Azotobacter and control treatment in case of essential oil content, but mycorrhizal treatment (0.23%) had a significant difference at a 5% LSD with Azotobacter (0.21%) and control treatment (0.21%). In general, according to the results of the experiment, the application of biological fertilizers in all qualitative and quantitative traits has an increasing effect. In selecting between Azotobacter and mycorrhiza, given that mycorrhiza has caused a significant increase in essential oil, it is recommended as a more appropriate choice for lemon balm.

**Keywords:** Lemon Balm, Biofertilizers, Essential oil, Mycorrhiza, Azotobacter

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## Effects of Different Concentrations of Chitosan on Growth and Phenolic Contents in *Momordica charantia* Linn.

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*Momordica charantia* Linn. (Cucurbitaceae) contains phenolic compounds such as phenolic compounds which are the most important natural antioxidants. Phenolic compounds such as flavonoids are plant secondary metabolites that have a high antioxidant power. However, use of elicitors could increase the antioxidant activity of plant. Chitosan is naturally-occurring compound that has potential in agriculture and act as elicitor in plant defense responses [2]. The purpose of this study was to evaluate the effects of chitosan on growth and content of phenolic and flavonoid compounds of *Momordica charantia*. Phenolic and flavonoid contents were measured by Folin-Ciocalteu and Aluminum chloride methods, respectively. The results showed that growth, total phenol and flavonoids increased by increasing chitosan concentration. Therefore, chitosan can be used to increase antioxidant properties of *M. charantia* as a natural antioxidant.

**Keywords:** Chitosan, Phenolic compounds, Growth, *Momordica charantia* Linn.

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## Phytochemical Evaluation and Comparing of Seed, Leaf and Root in the Wild Populations of Some Species of *Eremurus* M. Bieb. in Iran

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The genus *Eremurus* M.Bieb. (Serish) of the family Asphodelaceae consists of two subgenera in Iran. The subgenus *Eremurus* has two species including *Eremurus nderiensis* (STEV.) Boiss. and *Eremurus spectabilis* M.Bieb. that are distributed in the areas of west, north west, center, north and north east of Iran. Genus *Eremurus* with Arabic name “Eshras” was considered an important medicinal plant and in traditional medicine seeds, leaves and roots of this plant were used to treatment of many diseases such as constipation, diabetes and disorders of the liver, stomach, kidney and skin, also its roots were used as a natural glue. Leaves of Serish are used as a edible vegetable or sometimes in cooking. In this study, seed, leaf and root of the four populations related to species *E. nderiensis* (from the Delijan, Meymeh, Golpayegan and Semnan counties) and two populations related to species *E. spectabilis* (from the Firuzkuh county and Zeyar village) were collected in May 2017 and then were identified. Complete samples with flower and fruit were kept as original specimens in the Central Herbarium of Tehran University (TUH). After drying in the shade, studied samples were powdered by grinder and the process of extraction was performed. Subsequently, measurement of the content of chemical compounds including phenol, flavonoid, flavonol, carbohydrate and protein was done by spectrophotometry. Then data were analyzed using Excel and SPSS softwares. The results showed that levels of this compound are different between plant organs, so that highest amount of phenolic compounds was observed in leaves and its lowest amount in seeds. But the amount of flavonoids were highest in seeds and lowest in roots. Also, the maximum and minimum content of flavonol was found in the leaves and roots, respectively. The highest amount of carbohydrate and lowest amount of protein was observed in the roots, while lowest amount of carbohydrate and highest amount of protein was found in the seeds. Moreover, content of chemical compounds are different between species and among populations of each species regarding to environmental factors such as elevation and geographical coordinates. Finally, it can be concluded that the studied organs of the genus *Eremurus* are rich in chemical compounds such as phenols and thus have useful pharmacological and antioxidant potential. Also considering therapeutic potential of this genus, it can be used as a important medicinal plant for cultivation, production and propagation.

**Keywords:** Eremurus, Species, Popoulation, Chemical compounds, Medicinal plant

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## Protective Effects of Olive leaf Extract on Diabetes in Rats.

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The aim of the present study was to evaluate the olive leaf extract effects on streptozotocine (STZ)-induced diabetes and to examine its modulatory effects on sperm quality. Twenty adult male Sprague–Dawley rats were divided into four equal groups: the first group served as untreated control. Groups 2, 3, and 4 of rats were injected STZ (65 mg/kg). The animals which exhibited blood glucose levels higher than 250 mg/d by days 4-6, were considered as diabetic rats. Groups 3 and 4 received olive leaf extract (100 and 150 mg/kg, orally) and vehicle to the control and diabetic rats for 10 consecutive days. Glycated haemoglobin percentage (%HbA1c) as a diabetic index significantly decreased in the animals ingested by the 150 mg/kg of the extract compared to the diabetic group ( $P < 0.001$ ). Olive leaf extract (150 mg/kg) could improve sperm quality of the treated rats against STZ deleterious effects in the diabetic rats ( $P < 0.001$ ), however, total sperm motility was significantly higher in the diabetic rats ( $P < 0.001$ ). Cholesterol concentration significantly increased in the diabetic and the extract-treated groups compared to the controls ( $P < 0.001$ ), and triglyceride level significantly decreased in the extract-treated animals (150 mg/kg) compared to the diabetic and the extract 100 mg/kg groups. Our data suggest that olive leaf extract possesses beneficial antidiabetic effects on STZ-induced diabetes in rats and may be a good candidate to decline diabetes complications in men.

**Keywords:** Olive extract, Diabetes, Rat, Testis





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## Effects of *Salvadora persica* Extract on Growth Factors and Immune System in Gold Fish (*Carassius auratus*).

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Today uses of natural substances are preferred to chemical and synthetic compounds for growth and immune enhancement of aquatic organisms. This study was performed to evaluate the effects of oral administration of *Salvadora persica* extracts, on survival rate, growth factors and immune system in gold fish (*Carassius auratus*). For this purpose three hundred gold fish ( $25 \pm 5$  g mean weight) were purchased from a local fish farm and transferred to the laboratory. After acclimatization to the laboratory conditions the fish were randomly divided into four groups each with triplicate. The first group was fed only with a commercial diet (control) while other groups received *Salvadora persica* extracts with the commercial diet in different doses of 1, 3, and 6 percent for a period of 21 days and growth parameters and some immune factor were analyzed at days 0 and 21. The results showed the highest final weight, final length, percentage increase in body weight, average daily growth, special growth rate, condition factor and lowest feed conversion ratio was in treatment 6%, which had a significant difference with other treatments ( $P < 0/05$ ). The highest white blood cell count was observed in treatments 3 and 6%. All three treatments fed with herbal extracts had more lymphocytes than control ( $P < 0/05$ ). The highest amount of lysozyme was observed in treatments 6% and 3% respectively and the highest amount of IgM in treatment 6% that shows difference with others treatment ( $P < 0/05$ ). By the results we can say add the *Salvadora persica* extract in level 6% can increase growth performance and improve some blood indices, adaptive immune system and innate immune system in gold fish.

**Keywords:** *Salvadora persica*, Growth factors, Immune system, Gold fish

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## Evaluation of Antibacterial Activity Extracts of *Zingiber officinale* (ginger) Against Foodborne Pathogens and Comparative with Current Antibiotics for Treatment.

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Ginger (*Zingiber officinale*) has extended medicinal application and because of antimicrobial activity, it can be used in the treatment of various infectious diseases. The main pharmacological activities of ginger and its derivatives include Immune modulation, anti-tumor, anti-inflammatory, anti-apoptosis, antiemetic and anticancer activities. Given that Ginger has antimicrobial activity, so in this study antibacterial activity of this herb were evaluated. For this purpose, the rhizome of the plant after buy, squelch and drying, weigh and grounded then hydroalcoholic and water extracts was prepared by maceration ginger rhizome respectively in alcohol 80% and water solvents. After condensation of different extracts by Cup Plate Method and Tube Dilution method, Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) of ginger on salmonella typhi, Bacillus cereus and Staphylococcus aureus were measured. Finally, antimicrobial effects of extracts with each other and with some antibiotics, were compared. The results of the inhibition zone obtained from Cup plate method showed that the most effect of hydroalcoholic extracts is against Staphylococcus aureus and after that is Salmonella typhi. In this study, the lowest effect was seen with aqueous extract on Bacillus cereus. Actually Bacillus cereus was more resistant than two other bacteria. The results of MIC and MBC for Salmonella typhi and staphylococcus aureus respectively were 0.125 and 0.25 g/ml, and for Bacillus Cereus was 0.25 and 0.5 g/ml. Ginger (*zingiber officinale*) has extended medicinal application and because of Antimicrobial activity.

**Keywords:** *Zingiber officinale*, Staphylococcus aureus, Salmonella typhi and Bacillus cereus

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## Study of Chasmogamous Cleistogamous Mixed Breeding System on Iranian Wild *Viola* spp.

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Plants which have both open, out-crossing chasmogamous and closed, self-pollinating cleistogamous flowers are distributed over 50 angiosperm families. The chasmogamous cleistogamous mixed breeding system is a successful reproductive strategy because it can guaranteed seed output over a range of different environmental and pollinator conditions and maintain sexually produced progeny even in the absence of pollination agents. Some Iranian wild spring *Viola* spp. growing in North and west north of Iran including Gilan, Mazandaran, Gorgan and Tarom (Province of Zanjan). These species are wild medicinal plants and not cultivated. This research focused on flowers biology and seed set on them in controlled conditions at University of Zanjan (Iranian Live Collection of Medicinal Plants-ILCMP). The results showed that cleistogamous flowers are not completely closed in some *Viola* genotypes. Because the remaining matured stamens in cleistogamous flowers that have active pollen grains, can pollinated other open flowers. This report is first in *Viola* spp. pollination mechanisms in world.

**Keywords:** *Viola* spp., Chasmogamy, Cleistogamy

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## The Study of Basil Seed Gum Effect on Low-fat Process Cheese Quality

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Today, by raising the people's awareness of fat consumption, a considerable increase in demanding of low-fat foods including low-fat cheeses has been developed. Basil seeds are pharmaceutical materials, which have been used to dispel many diseases from ancient times. Considerable amount of mucilage appears around the basil seeds when they soak in water, which is a rich source of hydrocolloid with outstanding functional properties. In this study, basil seed gum (BSG) was used as replace fat in processed cheese. BSG with three concentrations of 0.5, 1, 2% was added to processed cheese. The control sample had no basil seed gum. Physicochemical tests for pH, moisture, protein, the amount of fat in dry matter and the amount of dry matter were done on the final product. The results showed that the amount of protein, moisture and fat in dry matter of cheese with BSG (1 and 2%) was higher than control samples and pH and dry matter was lower. The best results were observed in the processed cheese with 2% of BSG. This study shows the desirability of BSG as fat replacer in order to improving the quality of processed cheese.

**Keywords:** Low-fat processed cheese, Basil Seed Gum

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## Protective Effects of *Quercus Brantii* against lead-induced Oxidative Stress in male Reproductive System of Mice Model.

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Exposure to heavy metals such as lead (Pb) results in oxidative stress in male reproductive system. Herbal plants can utilize as antioxidant agents for protecting against oxidative stress. *Quercus Brantii* (QB) has been shown antioxidant activity in previous studies. The aim of present study was to evaluate effects of QB hydro-alcoholic extract against Pb-induced oxidative stress in male mice reproductive system. Forty-eight NMRI male mice were randomly divided into 8 groups of 6 animals each. Group I was the control group and received nothing. Group II was the sham group and only received distilled water. Groups III and IV received QB extract, 500 and 1000 mg/kg b.wt respectively. Group V, received Pb 1000 p.p.m/kg b.w. Group VI and VII received both Pb 1000 p.p.m/kg b.w. and QB extract at doses of 500 and 1000 mg/kg b.w respectively at the same time. The groups were treated by oral gavage. After 35 days, sperm parameters were evaluated. Concentrations of sexual hormones including LH, FSH and testosterone were assessed and TAC, SOD and MDA levels of serum were measured in animals. Exposure to Pb was negatively impacted Sperm parameters, decreased serum concentrations of sexual hormones, TAC and SOD activity and increased MDA levels. In other hand, co-administration of QB hydro-alcoholic extract with Pb considerably improved sperm parameters, increased sexual hormones, TAC and SOD activity and also decreased MDA levels in serum. Administration of QB protects male reproductive system against Pb induced oxidative stress.

**Keywords:** Lead, Oxidative Stress, Oak Tree, Antioxidants, Sperm, Lipid Peroxidation



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## Evaluation of growth and yield of *Citrullus colocynthis* L. grown in rainfed conditions of Kazeroun.

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Bitter melon (*Citrullus colocynthis*) Schrad. is an annual plant that grows in different parts of Iran, belongs to Cucurbitaceae family which is so called Hendevaneh Abujahl in Persian. Bitter melon has important properties such as anti-diabetes, anti-virus, anti-microbe and anti-cancer effects. Different parts of the plant including seeds, fruit, root, stem, and leaves, can be used as the medicines. This medicinal plant grows abundantly in Kazerun city especially in the summer season without irrigation. Kazerun city is located in the western of Shiraz city which has the importance of ecological diversity; because it is surrounded by the Zagros mountains from the north and south with annual average rainfall of approximately 450 mm. For this reason, it is considered to be very valuable to the biodiversity of the plant. In order to determine the growth and yield of wild bitter melon grown around the city of Kazerun, 100 plants at different locations were collected from their natural habitat in end of June 2017 and then dried. The average plant height (285 cm), number of lateral branches (15 per plant), number of fruit (20 per plant), fresh and dry weight per plant 610 and 200 g were measured. The fresh and dry weight of fruits per plants, fresh and dry weight of each fruit were 2.15 kg, 365 g, 120 and 32.30 g, respectively. The results demonstrated that the number of seeds per fruit 288, 1000- seed weight 73 g, seed weight per plant 23.1 g, fruit shell weight 9.46 g were obtained. Over all, according to the results and growth of bitter melon in rainfed conditions, it can be concluded that due to the recent droughts and water scarcity in Iran, bitter melon as a medicinal plant which has resistance in drought conditions and extensive pharmacological effects, can have suitable yield and growth.

**Keywords:** Bitter melon, Water scarcity, Growth, Drought

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## Antibacterial Activity of Fucoxanthin Containing Extract of Marine Seaweeds (*Dictyota Indica* and *Iyengaria stellata*) from Persian Gulf.

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Marine seaweeds are the source of bioactive compounds like carotenoids, vitamins and minerals. Fucoxanthin is the most important carotenoid found in marine brown seaweeds which has many properties like antioxidant, antibacterial, anticancer, antiobesity, anti-inflammatory and etc, due to its unique structure. The aim of this study was extraction of fucoxanthin from two species of brown seaweeds (*Dictyota Indica* and *Iyengaria stellata*) collected from intertidal zone of Persian Gulf, Qeshm Island. Fucoxanthin was extracted by methanol and identification was carried out by High Performance Liquid Chromatography equipped with UV detector. The antibacterial activity of fucoxanthin containing extract against gram negative bacteria (*Escherichia Coli*: PTCC1330) and gram positive bacteria (*Staphylococcus aureus*: PTCC1112) was assessed by disc diffusion method. Moreover minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) tests were investigated by tube dilution procedure method. The results showed that both studied seaweeds have sufficient fucoxanthin content. *D. Indica* showed higher amount of Fucoxanthin in compare with *I.stellata*, approximately 462.79 µg/g that can make it commercially applicable e.g. in food and pharmaceutical industries. Furthermore, the samples showed considerable inhibition zone against gram negative bacteria (*Escherichia Coli*: PTCC1330) and gram positive bacteria (*Staphylococcus aureus*: PTCC1112). The inhibition zone of *D.indica* and *I. stellata* against *E.Coli* and *S.aureus* bacteria were 17 and 18 mm, 15 and 16 mm respectively. MIC and MBC values of extract from *D. Indica* and *I. stellata* were close to each other and confirmed the result of inhibition zone.

**Keywords:** Antibacterial, *Dictyota Indica*, Fucoxanthin, *Iyengaria stellata*, Persian Gulf

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## Green Synthesis of Silver Nanoparticles Using Root Part of *Eryngium Caeruleum* Extract: an Antibacterial Study.

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*Eryngium caeruleum* is a perennial herbaceous plant that is native to northern Iran and reproduces from permanent roots and/or seed. Different organs of *E. caeruleum*, such as root, leaf, stem and inflorescence have medicinal properties, so that the plant has been used as a traditional medicine at different regions of Iran. In this study, synthesis, characterization, and antibacterial activity of the silver nanoparticles (SNPs) by extract of root part of *E. caeruleum* (as an intermediate) were reported. Characterization of the as-biosynthesized SNPs was carried out by using Fourier transform IR spectroscopy at different concentrations of *E. caeruleum* extract. Morphology of the biosynthesized SNPs was investigated using X-Ray diffraction, transition electron microscopy (TEM), and field emission scanning electron microscopy (FE-SEM) at various concentrations of the plant extract. Once the formation of the SNPs was confirmed by the results of the mentioned techniques, its antibacterial properties was further studied against gram positive (*Bacillus cereus* and *Staphylococcus aureus*) and gram negative (*Escherichia coli* and *Salmonella typhimurium*) bacteria. The results indicated stronger antimicrobial effect of the SNPs rather than AgNO<sub>3</sub> and *E. caeruleum* extract. Investigating SNPs synthesized at various *E. caeruleum* extract concentrations, this study introduced a green, fast yet easy method for preparing these well-known nanoparticles.

**Keywords:** *Eryngium caeruleum*, Medicinal plant, Silver nanoparticles, Green synthesis

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## The Green Synthesis, Characterization and Antibacterial Activities of Silver Nanoparticles Synthesized from Green Cucumber Peels.

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Green synthesis of nanoparticles was more preferred than chemical synthesis since it is involved in the reduction of metals using various hazardous chemicals. Naturally, plants possess both the primary and secondary metabolites to carry out the green synthesis [1]. Synthesis and studying chemical and physical properties of silver nanoparticles (AgNPs) are currently of considerable interest because of their potential applications in mechanics, optics, sensors, drug delivery, DNA sequencing and biomedical applications. In this study, to explore the novel approaches for the biosynthesis of silver nanoparticles, the cucumber peels extract was mixed with silver nitrate (AgNO<sub>3</sub>) to synthesize silver nanoparticles. The successful formation of Ag-NPs was confirmed by UV-visible, SEM, XRD techniques. UV-visible spectra showed the characteristic surface plasmon resonance peak of synthesized AgNPs between 380 and 460nm. XRD confirmed the crystalline structure of nanoparticle and any characteristic peaks of the impurity phases in the XRD spectrum wasn't observed. Scanning electron microscope (SEM) showed the spherical morphology of the particles whereas size distribution was measured that size of AgNPs were in the range of 30–70 nm. Biosynthesized Silver nanoparticles exhibited antibacterial activity against both gram positive and gram negative bacteria, *Staphylococcus aureus* and *Escherichia coli* respectively.

**Keywords:** Synthesis, Silver nanoparticle, Cucumber peel extract, Antibacterial activity

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## Efficiency of Five Different *Agrobacterium Rhizogenes* Strains on Hairy Root Induction in *Perovskia Abrotanoides* Karel.

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*Perovskia abrotanoides* Karel. (Lamiaceae), which is known locally as Barazambal in Iran, is a medicinal plant containing some important pharmaceutical secondary metabolites such as diterpenoid tanshinones and phenolic acids. Recently, reports have confirmed some therapeutic properties of *Perovskia* species such as leishmanicidal, antibacterial, antifungal and antiplasmodial effects, which were mainly attributed to their secondary metabolites. *Agrobacterium*-mediated hairy root cultures represent an effective tool for secondary metabolites production, compared to their parent plants. For this reason, the present study was aimed to establishment of an efficient hairy root culture protocol in *P. abrotanoides*. Mature seeds were harvested from wild plants, and after sterilization were cultured on free hormone solid MS basal medium. Five *A. rhizogenes* strains (A4, A7, ATCC15834, LBA9402 and R1000) were used to infect the leaf and internodal explants, as well as nodes on one-month old plants of *P. abrotanoides*. Wounded explants and nodes were inoculated with bacterial suspensions and then were cultured on MS medium for 48h at 25°C under 16:8 light: dark period. After 48h of co-cultivation, 1-1.5 cm long tip roots were excised and cultured on the ½MS semi-solid medium containing cefotaxim (400 mg/L) for 15 day to remove residual bacteria. Transgenic hairy roots lines developed in MS liquid medium were confirmed by PCR amplification of rolC as the target gene. The percentage of hairy root induction was recorded after 20 days of culture in MS medium containing cefotaxim and the results showed that bacterial strains had significant effects ( $P < 0.05$ ) on frequency and time of hairy root formation. The obtained results showed that, all strains of *A. rhizogenes* were used in this study were able to induce hairy roots on the wounded nodes and their Ri plasmids were integrated into the genome of host cells. Four days after inoculation, the first hairy root lines were emerged on the wounded nodes infected with A4 strain. Based on our findings, *A. rhizogenes* A4 strain was the most efficient strain in transformation and initiation of hairy roots with the frequency of 77.77% follow by A7 (66.67%) and ATCC15834 (58.33%). The lowest percentage of root induction was achieved with LBA9402 (33.33%) strain at the 9th day of induction. In conclusion, our results supported that with the application of efficient *A. rhizogenes* strains and suitable culture conditions, it could be possible to establish potent hairy root cultures in *P. abrotanoides*.

**Keywords:** *Perovskia abrotanoides* Karel., *Agrobacterium rhizogenes*, Hairy root culture

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## Hairy Root Induction in *Thymus Vulgaris* Using Different Strains of *Agrobacterium rhizogenes*

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Thyme (*Thymus Vulgaris* L., Lamiaceae) is a small subshrub native to the western Mediterranean region of Europe. *T. vulgaris* essential oil is a mixture of mostly monoterpenes. The main compounds of this oil are secondary metabolites such as thymol and carvacrol. These natural terpenoids have antioxidant, antimicrobial, antitussive, expectorant, antispasmodic, and antibacterial effects [1]. *Agrobacterium rhizogenes* is a genus of gram-negative soil bacteria belonging to the Rhizobiaceae, responsible for hairy root formation at the site of infection. This bacterium can transfer T-DNA fragments of Ri plasmids to the plant cells. In addition, *A. rhizogenes* is the causal agent of 'hairy root' diseases in plants, and has been used for the production of hairy root cultures from a multitude of plant species. Nowadays hairy root cultures from plants are getting considerable attention because of their genetic and biochemical stability, rapid growth rate and ability to synthesize secondary products at levels comparable to the original plant [2]. In this study, different strains of *A. rhizogenes* in terms of transgenic ability in *T. vulgaris* are examined. Leaves and stems were selected as explants. Strains A4, A7, A13 and 15834 have been used to induce Hairy root. Among the examined strains, strain 15834 induced the phenotype of the hairy root in the leaf explants.

**Keywords:** *Agrobacterium rhizogenes*, Secondary metabolites, Thyme

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## Production of Tanshinones and Phenolic Acids in Hairy Root Cultures of *Perovskia abrotanoides* Karel.

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*Perovskia abrotanoides* Karel. (Lamiaceae), with vernacular name of Brazambal in Iran, contains two major classes of secondary metabolites (diterpenoid tanshinones and phenolic acids), which are responsible for the pharmacological activities of the plant. Ability to synthesize a wide range and a large amount of secondary metabolites are the most important advantages of hairy root cultures. The main purpose of this study was to investigate the production of biomass, tanshinones and phenolic acids in hairy root lines of *P. abrotanoides*. Mature seeds were collected from wild plants and were cultured on free hormone MS medium. *Agrobacterium rhizogenes* strain A4 was used to infect the nodes on one-month old plants of *P. abrotanoides*. Then infected plants were cultured on MS medium for 48h at 25°C under 16:8 light: dark period. Transgenic nature of regenerated roots was confirmed by PCR amplification of *rolC* as the target gene. The hairy root line A4L2 was selected for further experiments. The hairy roots were harvested at intervals of 4 days and their fresh and dry weights were measured. The contents of phenolic acids and tanshinones in the hairy roots were determined by HPLC method. The growth curve and metabolites accumulation patterns of hairy roots were obtained during a 40-day growth cycle. Quantitative analyses indicated that the whole growth cycle could be divided into four stages: adaptive phase (0-4th day), exponential phase (4-24th day), stationary phase (24-36th day), and decline phase (after the 36th day). The highest biomass (3.90g FW and 0.37g DW) accumulation, as well as the maximum contents of rosmarinic acid (5.88 mg/g DW), salvianolic acid A (0.47 mg/g DW), salvianolic acid B (12.72 mg/g DW), cryptotanshinone (2.61 µg/g DW), tanshinone I (1.54 µg/g DW) and tanshinone IIA (2.86 µg/g DW) were achieved on the 36th day. The amounts of rosmarinic acid, salvianolic acids A and B in hairy roots were increased by 49.40, 78.77 and 43.69%, respectively, as compared to the intact roots, however no significant increases were found in tanshinones contents. Our findings indicated that hairy root culture could be a promising tool to produce tanshinones and phenolic acids in *P. abrotanoides*.

**Keywords:** *Perovskia abrotanoides* Karel., *Agrobacterium rhizogenes*, Hairy root culture,

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## Bedsore Subcutaneous Wound Treatment Using Pads Enriched with Medicinal Plants and Silver Nanoparticles

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Bedsore or compression is a lesion that occurs on the skin and in the subcutaneous tissues due to prolonged and prolonged stresses on the skin at one or more points. Subcutaneous wounds often occur in areas of the body where the skin is located on a bony prominence, and there is no muscle among them, such as the back of the skin and between the hips and the heel. Subcutaneous ulcers are more likely to occur in those who have to stay in bed for a long time or to sleep, and the patient has no ability to change his or her condition, or patients are admitted or in coma and also paralyzed persons resulting from strokes. The brain is more affected by this lesion. In this research, using a combination of natural and herbal practices such as leafy leaf, curd powder, turmeric powder, chamomile, mudflower and powdered powder, mixed with natural honey prepared as a suspension, and inside a pad. A coating of silver nanoparticles that can penetrate the body and ultimately to treat ulcers. Studies and studies on the properties and structure of this proposed compound suggest that it can be a good treatment for patients with flatulence. The duration of the treatment is between 30 and 90 days, which is based on the cooperation of the immune system to prevent bacterial and fungal infections caused by the ulcer of the substrate, which should be replaced once a day. Based on this research, we have found very good results in treating the wounds of the bed using this kind of pad based on medicinal herbs and honey bed, as well as sterilized with silver nanoparticles, which is very useful for treatment of patients. It is hoped that in the near future industrial production of this type of product in the country will be supported by the industry and the Ministry of Health.

**Keywords:** Subcutaneous wound, Herbal medicine, Cover pad, Infection, Natural honey

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## Anti-Fungal and Anti-Bacterial Effect of Essential Oil of *Zhumeria majdae*.

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*Zhumeria majdae* Resh. f. & Wendelbo. is the member of monotypic genus (*Zhumeria*) from Menthaeae family. The exclusive habitat of this plant is southern Iran (near the Persian Gulf) and the plant commonly grows on bare rocky slopes. This plant has a wide spectrum pharmaceutical properties such as antinociceptive and anti-inflammatory (and antiangiogenesis). In this study, we investigated the Anti microbial effect of essential oil of this plant. Three bacteria strain (*Escherichia coli* ATCC 25922, *Staphylococcus aureus* ATCC 33591, and *Staphylococcus aureus* ATCC 12600) were used for disk diffusion assay anti-bacterial test. In addition, inhibitory effect on growth for three fungi (*Chaetomium globosum*, *Penicillium funiculosum*, *Fusarium graminearum*) was examined. All microorganisms showed susceptibility to essential oil of *Z. majdae*. The most susceptible bacterium was *E. coli* (20 µl). Among the fungi, *C. globosum* showed lowest growth rate in presence of essential oil.

**Keywords:** Anti-bacterial, Anti-fungal, Essential oil, *Zhumeria majdae*

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## Maviz *Vitis vinifera* L. as a Traditional “Hot” Herb Reverses Memory Impairment Induced by Hypothermia: a Behavioral Study

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Iranian Traditional Medicine (ITM) describes a kind of dementia with similar signs and symptoms of Alzheimer's disease (AD). It explains the pathology of dementia with cold dys temperament of the brain, which means that the brain is colder than its healthy form. ITM strategy for treatment of dementia is to heat the brain up by medical “hot” herbs. *Maviz* (special kind of dried grape, *Vitis vinifera* L.) is one of these “hot” herbs. To evaluate the veracity of ITM concept about dementia and its treatment, we previously showed that 14-day cold water-induced hypothermia impairs learning and memory similar to that of AD [1]. In this study, we try to examine if *Maviz* as a “hot” herb reverses this impairment. Rats in cold-water-induced hypothermic (CWH) groups were immersed up to the neck in 3.5°C water, for 5 min during 14 consecutive days. As a control, rats were forced to swim in warm water at the same conditions. To eliminate the impact of forced swimming stress, a group of intact rats was also added. To evaluate the activity of the herb, some groups received drug (single doses of 50, 200, and 400 mg/kg in day 14, or daily doses of 1 and 10 mg/kg) or vehicle via i.p. injection. Learning and memory were assessed by Morris water maze. The results showed that CWH impairs learning and memory and 50 mg/kg of the herb reversed memory impairment. ITM theory about the relationship between brain hypothermia and dementia is in accordance with our findings. *Maviz* and other traditional “hot” herbs can be good candidates for more investigation on AD drug therapy.

**Keywords:** Iranian traditional medicine, Alzheimer's disease, Hypothermia, *Vitis vinifera* L.

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## Essential Oil Composition at Different Plant Growth Development of Peppermint (*Mentha × piperita* L.) under Water Deficit.

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Peppermint is one of the most important and commonly used medicinal and aromatic plants worldwide. Present experiment was conducted to evaluate the essential oil content and quantitative changes of the main components of peppermint plants at different stages of crop growth. Greenhouse pot grown peppermint plants (30, 60 and 90 days after transplanting) were subjected to three different field capacity (FC) irrigation conditions, i.e. no stress, mild stress (60± 5% FC) and moderate stress (40± 5% FC) for one month. Essential oil composition and accumulation in peppermint was different by plant growth stage alterations. The proportions of some monoterpenes such as menthofuran, limonene, and pulegone reduced as plant matured, while those of menthol, cineole, and neomenthol increased. Both mild and moderate water stresses changed the essential oil content. Essential oil percentage of plants subjected to mild stress increased while moderate water stress treatment caused a significant reduction in essential oil percentage in different plant growth stage. Moderate stress reduced the essential oil percentage and changed the essential oil profile. Menthone content decrease and menthofuran content were increased under moderate stress. Also, relative proportions of sesquiterpenes were increased with water stress.

**Keywords:** Essential oil, *Mentha × piperita*, Menthol

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## Animal manure and bio Fertilizer affected *Nigella* (*Nigella sativa*) Yield

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*Nigella* (*Nigella sativa*) from Ranunculaceae family is a widely used medicinal plant throughout the world. It is very popular in various traditional systems of medicine like Iran. *Nigella* seed and oil have a long history of folklore usage in various systems of medicines and food. The seeds of *N. sativa* have been widely used in the treatment of different diseases and ailments. To study the effect of different animal manure and bio fertilizers on yield and yield components of *nigella*, a greenhouse experiment as factorial in complete block design was conducted with three replications. Treatments included of no fertilizer (control), animal manure (cattle manure, sheep manure and chicken manure), bio fertilizers (azetobacter, petabacter, and azetobacter with petabacter) and combinations of animal manures and bio fertilizers. Results showed that animal manures had significant effects on yield and yield components of *nigella* so that, chicken manure increased biomass, seed yield, harvest index, plant height, number of seed per capsule, and number of capsule per plant 21.2, 28.1, 12.5, 34.5, 25.1 and 19.9% compared to control, respectively. Interaction effect of animal and bio fertilizers showed that the highest seed yield (4.11 g/plant) and biomass (27.9 g/plant) observed in chicken manure with petabarvar treatment. Likewise, the heights capsule number and seed number per capsule was observed in chicken manure and chicken manure with petabarvar treatments. Overall, results showed that chicken manure alone or in combination with petabarvar affected yield and yield components of *nigella* more than the treatments, significantly.

**Keywords:** Chicken manure, Petabarvar, Seed yield, Harvest index

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## The Optimization of *in vitro* Propagation of *taxus baccata* L.

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Yew tree by the scientific name of *Taxus baccata* L. belongs to *Taxaceae* family. The medicinal value of this species is entirely due to Palitaxal with the commercial name of Taxol being present in its leaves. Taxol by nature is valuable which develops an abnormal spindle formation and in turn, prohibits DNA transcription in mitosis cellular division and eventually, causes cells being in dividing stage to die. This drug is believed to be one of the most effective anticancer medicines being known in recent years. Due to the surging demand for Taxol as the most effective anticancer composition and also, having an eye on restriction of exploitation being currently prevailed in order to protect and preserve the remaining yew tree forests scattered in the green belt of the North of Iran, *in vitro* propagation of the plant has been assayed in this studied. The effect of different kinds and concentrations of plant growth regulators and complex of amino acids as biostimulators were studied for inducing *in vitro* shoot and root on *T. baccata* explants. The results indicated that DKW medium supplemented by 2.5 ml of amino acids complex as well as 2ip at 3mg l<sup>-1</sup> and BAP 3mg l<sup>-1</sup> at proved to be the best treatment in terms of percentage of shooting (66/25 %) and also the length of regenerated shoot (4/75cm). The regenerated plantlets rooted in DKW medium with 2.5 ml of amino acids complex without any plant growth regulator. Finally, the regenerated plantlets were successfully transformed to pot and green house.

**Keywords:** *Taxus baccata*, *in vitro* propagation, Amino acid complex, Plant growth regulators

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## Prolong Water Deficit Stress and Salicylic Acid Mediated Changes in Antioxidant Capacity, Metabolite Profile and Flavonoid Concentration in Peppermint *Mentha × piperita* L.

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Peppermint (*Mentha × piperita*) is one of the most important and commonly used medicinal and aromatic plants worldwide. Peppermint infusion is a valuable source of antioxidants. By using elicitors and inducing abiotic stress this antioxidant property can be enhanced. This experiment was conducted to evaluate the foliar application of salicylic acid (2 mM) and water deficit stress (no stress, mild stress and severe stress as 100, 75 and 50% of field capacity, respectively) and their interactions on cultivated peppermint on plant growth, secondary metabolite profile and antioxidant capacity of peppermint infusions. Water deficit stress alone or with SA treatments increased antioxidant capacity, total phenolic and flavonoid contents significantly. Some phenolic compound such as quercetin, coumaric acid and luteolin were detected only in water-deficit or in SA treated plants. Also, fewer amino acids and unsaturated fatty acids were identified. Also, foliar application of 2 mM SA treatment improved plant growth parameters and metabolite profile such as carbohydrates and amino acids in non-stress and stress conditions. Therefore, inducing water stress and applying SA is recommended to enhance the biologic properties of peppermint and improve bioactive compounds and the antioxidant capacity of peppermint infusions.

**Keywords:** Water deficit stress, Peppermint infusion, Phenolic compounds, Antioxidant capacity

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## Evaluation of Effects of Dried Latex of *Calotropis Procera* and Vitamin C on Type 1 Diabetes.

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Diabetes mellitus is a serious medical problem that the outbreak is increasing all over the world [1]. The present study investigates the effects of aqueous suspension of dried latex of *Calotropis procera* with vitamin C in diabetic rats. Diabetes was induced intraperitoneally (IP) in rats by a single dose of streptozotocin (50 mg/kg b.w). Thirty adult male Wistar rats with approximate weight of 180-200 gr were randomly and equally divided into six groups as follow: first group) control, second group) diabetic rats, third group) include diabetic mice that were treated by 200 mg dried latex per kilogram of body weight, the fourth group) the diabetic rats of this group were treated by combined treatments of dried latex of 200 mg/kg and vitamin C of 100mg/kg b.w by gavage, fifth group) animals in this group were treated by 200 mg/kg b.w dried latex by gavage and the sixth group) includes rats were treated by 100mg/kg b.w vitamin C by gavage daily. At the end of 15 days, the biochemical factors of blood sugar, total cholesterol were studied after direct anesthetizing of animals and blood samples were taken from the heart. According to the studies, the amount of blood sugar, total cholesterol were increased significantly in diabetic group. But the treatment of diabetic group by aqueous extract of dried latex and also the combined treatments of aqueous extract of dried latex and vitamin C improved and reduced the above biochemical factors significantly. The results of this research work showed that the aqueous extract of dried latex compared to the group four, had a better effect in reduction of serum biochemical factors. The conclusion is that the dried latex of *Calotropis procera* could therefore play important role in reducing diabetic complications in type 1 diabetes.

**Keywords:** Type 1 diabetes, vitamin C, *Calotropis procera*, Blood sugar, Total cholesterol

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## Quality Enhancement in Fresh Meat by Employment of Grape Seed Extract Incorporated Chitosan Edible Coatings.

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To improve quality and increase the shelf life of food products during storage, synthetic additives have been commonly used by the food industry. But with an increased dislike of consumers for synthetic additives, efforts to find natural additives as replacements are gaining momentum. Currently, there is a growing interest in the use of natural antimicrobial agents and antioxidants derived from plant sources. The use of plant-derived nutraceuticals may afford meat processors the opportunity to develop novel meat products with enhanced nutritional and health benefits, improved shelf-life, quality, and profile. The present study was conducted to evaluate the combined effect of chitosan edible coating (2%) containing grape seed extract (0.1%) on the shelf life and keeping the quality of chicken breast meat at refrigerated storage temperatures. The use of edible films and coatings in food processing are ways in which processors can produce a safer product furthermore, adding plant extracts gives the coatings antimicrobial and antioxidant properties. Chitosan has received considerable attention for its commercial applications in the food, pharmaceutical, cosmetic, paint, and textile industries. Chitosan coating has been shown to have a synergistic effect with grape seed extract for providing a type of active packaging to maintain quality and extend the shelf-life of meat. Grape seeds are rich sources of polyphenolic compounds, and these compounds act as antimutagenic, antiviral, anticarcinogenic and cardio-protective agents. Recognition of such health benefits has led to the use of grape seed extract as a dietary supplement. This study thus clearly indicated that the effect of chitosan coating containing grape seed extract on samples was to retain their good quality characteristics and extend the shelf life during refrigerated storage, which was supported by the results of microbiological, chemical, and sensory evaluation analyses.

**Key words:** Grape Seed Extract, Chitosan Coating, Fresh Meat, Health benefits





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**Extraction, Identification, Measurement and Comparison of the Active Constituents of Iranian *Achillea Biebersteinii* by Hydrodistillation and Ultrasonic Assisted Extraction.**

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In this research, the active components of *Achillea Biebersteinii* were obtained by two methods of hydrodistillation and ultrasonic assisted extraction and the results were compared. As one of the herbal species of the genus *Achillea*, Golden *Achillea Biebersteinii* has been used as a remedy for stomach flatulence in Jordanian folk medicine since long ago. Extraction was performed by a Clevenger apparatus and the extract was injected into GC-MS where Germacrane D with a yield of 32.10 %, showed the highest percentage among the 41 identified extracts. To extract the active constituents with ultrasonic waves, the parameters that could affect the efficiency of extraction were optimized. First, extraction was done with 0.5 gram of the plant and 10 mL of different solvents like hexane, ethanol, methanol, chloroform and water among which ethanol showed the highest extraction efficiency with an efficiency of 18.00% and was therefore the selected solvent in this research. Then, in order to the optimization of other parameters such as the volume of extracting solvent, extraction temperature and time, Box-Behnken design (BBD) with using statgraphics software were applied. Based on the Box-Behnken design, 15 experiments were carried out for the determination of optimal conditions, high-efficiency extraction and the analysis of interaction of parameters. The analysis of the findings suggested that the optimal conditions would be with 26 mL of solvent, with extraction time of 36 min and at the temperature of 45 °C. Extraction was performed in optimal conditions and the extracted constituents were injected into GC-MS for analysis. Using the findings from GC-MS analysis and with the help of retention indexes, 20 constituents were identified and Germacrane D (23.85%) and Norcomphor (20.74%) were the major ones. Analysis of the data revealed that using ultrasonic waves gave higher yields than hydro-distillation method and considering the interaction of parameters and determination of optimal extraction conditions, we can benefit from selectivity as compared to hydro-distillation method.

**Keyword:** Active components, Ultrasonic Waves, Hydrodistillation, *Achillea biebersteinii*.

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**Tocopheryl Polyethylene Glycol 1000 Succinate Modified Paclitaxel Nanoemulsion: Preparation and Investigation of Anticancer Effects on Paclitaxel-Resistant Breast Cancer Cells (MCF-7/PTX).**

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Paclitaxel (PTX) is among the most effective chemotherapeutic agents, presents great potency in treatment of a broad spectrum of solid tumors, such as breast cancer, ovarian cancer and non-small cell lung carcinoma. Multidrug resistance (MDR) developed by cancer cells represents a major challenge in the clinical cure of cancer by paclitaxel alone or in combination with other antineoplastic agents. The use of nanotechnology-based drug delivery systems to eliminate cancer drug resistance has proved to be efficient to improve drug delivery, enhance therapeutic efficacy, and reduce side effects. In the present study, a polyethylene glycol 1000 derivative of tocopheryl succinate (TPGS) incorporating nanoemulsion of carvacrol-rich *Satureja khuzestanica* essential oil was fabricated for delivering of paclitaxel as an anticancer agent. TPGS efficiently inhibits the P-gp function in paclitaxel-resistant breast cancer cells (MCF-7/PTX) and the natural essential oil showed significant synergistic effect in the presence of paclitaxel. The cytotoxicity of each component as well as TPGS incorporated paclitaxel-loaded nanoemulsion was evaluated by MTT assay. Cell cycle analysis of prepared nanoemulsion using flow cytometry technique represents a G<sub>2</sub>-M phase arrest by paclitaxel-loaded nanoemulsion. Apoptosis-induced effect of paclitaxel-loaded nanoemulsion on MCF-7/PTX cells was investigated by flow cytometry method using dual staining with annexin-V/PI. Significant improvement in apoptosis percentage was observed after cell treatment by paclitaxel-loaded nanoemulsion compared to pure paclitaxel. Moreover, fluorescent microscopy observations provided by DAPI staining confirmed the results obtained by apoptosis assay.

**Keywords:** Breast cancer, Paclitaxel, Multidrug resistance, TPGS, Nanoemulsion

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## Evaluation of Antioxidant and Antimicrobial Potential of *Nicotiana Rustica*

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This study was led with the purpose of evaluating the antioxidant and antimicrobial activity of essential oil of *Nicotiana rustica*. Essential oils were obtained by hydro-distillation using Clevenger type apparatus during approximately 3 hours and analyzed using gas chromatography/mass spectrometry (GC/ MS). Twenty eight components were identified in *N. rustica* essential oil that represented 93.87% of the oil. The main components of the oil were, Myristicin (32.75%), Turmerone (5.71%), Apiole (4.57%), Hexadecanoic acid (4.22%), Phthalic acid (3.93%) and 1,4, Eicosadiene (3.72%). Antioxidant and antimicrobial activity of the essential oil were performed using 1,1-diphenyl-2-picrylhydrazyl (DPPH), micro broth dilution and disc diffusion methods respectively. The antioxidant activity of *N. rustica* oil was  $IC_{50} = 27.93 \pm 0.834$ . The oil showed high antimicrobial activity against *Pseudomonas aeruginosa*, *Bacillus cereus*, *E. coli* and *Staphylococcus aureus*.

**Keywords:** *Nicotiana Rustica*, Essential Oils, GC/ MS, DPPH, Antioxidant, Antimicrobial

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## Anti-Diabetic Potential of Dried Latex of *Calotropis Procera* in Type 1 Diabetes Mellitus.

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Diabetes mellitus (DM) is a complex disease. For most people, it's a new way of life, and it affects relationships in all areas as much as it affects eating and physical activity. If blood sugar level remains consistently higher than normal, over time it can make damages on organs like heart, eyes, kidneys, nerves, and other parts of the body. The present study investigates the anti-diabetic properties of aqueous suspension of dried latex of *Calotropis procera* with vitamin C in streptozotocin-induced diabetic Wistar rats in vivo. To study the anti-diabetic properties of *Calotropis procera* in experimental type 1 diabetes, animals were divided into six groups: control rats, STZ-induced diabetic rats (50 mg/kg b.w. diabetic rats that were treated by dried latex (200 mg/kg b.w), diabetic rats were treated by combined treatments of dried latex and vitamin C (100mg/kg b.w), normal rats that received dried latex and normal rats were treated by vitamin C. At the end of 15 days, triglycerides and glycated hemoglobin (HbA1c) were studied after direct anesthetizing of animals and blood samples were taken from the heart. According to the studies, the amount of triglycerides and HbA1c was increased significantly in diabetic group. But the treatment of diabetic group by aqueous extract of dried latex and also the combined treatments of aqueous extract of dried latex and vitamin C improved and reduced the above biochemical factors significantly. The results of this research work showed that the aqueous extract of dried latex compared to the combined treatment, had a better effect in reduction of serum triglycerid. But combined treatments of dried latex and vitamin C were more effective than dried latex in decreased the elevated level of HbA1c in group two. So, regarding the studied of this research, the conclusion is that the dried latex of *Calotropis procera* could therefore play in reducing diabetic complications in type 1 diabetes.

**Keywords:** Streptozotocin, Vitamin C, *Calotropis procera*, Triglycerid, Glycated hemoglobin (HbA1c)

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## Evaluation Antioxidant Activity of Irradiated Chicory Root on Liver Necrosis Induced by CCl<sub>4</sub> in Rat.

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Gamma irradiation has been recognized as a reliable and safe method for improving the bio-components of plants. The aims of this study were to evaluate the effect of irradiated chicory root extract on liver necrosis. Twenty four adult male Wistar rats were divided equally in six treatments group. Group I) Control, Group II) CCl<sub>4</sub>, Group III) CCl<sub>4</sub>+ irradiated chicory root extract, Group IV) CCl<sub>4</sub>+ chicory root extract, Group V) irradiated chicory root extract and Group VI) chicory root extract. Animals were treated for time duration of 4 weeks. At the end of the study catalase (CAT), superoxide dismutase (SOD), lipid peroxidation (LPO) were evaluated. SOD and CAT levels were decreased in CCl<sub>4</sub> treated rats. Whatever, results shows that LPO level were increased in ccl<sub>4</sub> treated rats. Result shows that the elevated level of LPO in CCL<sub>4</sub> group was decreased by irradiated chicory and chicory root extract. Also, CAT and SOD levels were increased in Group III and IV. Moreover, results shows that the irradiated chicory roots are more effective than non-irradiated chicory. In conclusion, Gamma ray can increase bioactive component of chicory root and is more effective in scavenging free radicals which cause liver necrosis in CCL<sub>4</sub> treated group.

**Keywords:** Gamma ray, Liver necrosis, SOD, CAT, LPO

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## *Achillea willhelmii* Extract Ameliorates Ptz-Induced Oxidative Stress in Mice Seizure Model

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Epilepsy is the second most common nervous disorder after brain stroke. The role of oxygen-derived free radicals has been suggested in genesis of epilepsy and in the post seizure neuronal death. With respect to inefficiency of the usual treatments, it is necessary to find new medicine to prevent or treat epilepsy. The aim of this study was to investigate the preventive effect of *Achillea willhelmii* on epilepsy and post epileptic oxidative stress. Sixty male mice randomly allocated into 6 experimental groups, including 10 mice in each group as follows: 1-control group receiving only Pentylentetrazole (PTZ), 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> experimental groups received alcoholic extract of *A. willhelmii* extract in doses of 100, 200 and 300 mg/kg intraperitoneally 30 minutes before PTZ injection, 5<sup>th</sup> group was positive control that received valproic acid 100 mg/kg 30 minutes before PTZ injection and 6<sup>th</sup> group (Sham group) received distilled water as extract solvent of *A. willhelmii*. Chemical kindling was performed in all of them by a total of 11 treatments with intraperitoneal injection of PTZ 35 mg/kg at every 48 hours. In the 12<sup>th</sup> injection all groups were tested for PTZ challenge dose (75 mg/kg). Mice were observed 30 minutes after the last injection to detect convulsion. Then the mice were killed and the brains were quickly removed, and frozen for biochemical analysis. Malondialdehyde (MDA), nitric oxide (NO) and superoxide dismutase (SOD) activities were measured in brain tissue. Data analysis was carried out by one way ANOVA and Tukey posthoc tests. The results showed that administration of *A. willhelmii* had an inhibitory effect on the steps, progression and duration of seizure, especially in the last steps of convulsion. Biochemical analyses of brain tissue, revealed a significant increase in the MDA and NO levels in the PTZ group comparing to experimental groups. SOD level did not change in this group. While MDA and NO levels are significantly lower, SOD level is significantly higher in the experimental groups compared with PTZ and control groups ( $P < 0.001$ ). The present study demonstrated that *A. willhelmii* treatment may increase latent interval between seizures and decrease oxidative stress. It might be used as an adjunct therapy in epilepsy.

**Keywords:** Epilepsy, *Achillea willhelmii*, Malondialdehyde, Nitric Oxide (NO), SOD

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## The Effect of Various Light Spectrum with LED Lighting Sources on Morphological Characteristics of *Mentha spicata*.

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Light-emitting diodes (LED) have tremendous potential as supplemental or sole-source lighting systems for crop production both on and off earth. LED light technology present a number of advantages including long life, small volume, low heat emission, adjustable light intensity, high energy-conversion efficiency and wavelength specificity. The recent development and adoption of light-emitting diodes provides opportunities for targeted regulation of growth and phytonutrient accumulation by herbs to optimize productivity and quality under controlled environments. The aim of this experiment was to compare the effect of four LED light treatments [red (R), blue (B), red and blue (RB), white (w)] as sources of light on stem height, number of stems, stem diameter, length and width of leaves in *Mentha spicata*. Plants were pot cultured with a 16-h photoperiod at 30/16 °C (day/night), 74% relative humidity, 150  $\mu\text{m}^{-2}\text{s}^{-1}$  photon flux density under R (100%), B (100%), RB (70% +30%), W (100%) inside growth chambers for 50 days. The employed sources of light showed no significant differences in stem height in this plant among treatments, but these plants were characterized by a greater leaf length, leaf width and stem diameter when grown under B treatment. Additionally the number of stems were lower under B LED lighting. These results demonstrate that LEDs variably affected growth characteristics of *Mentha spicata*. Precise management of wavelength may hold promise in maximizing quality of vegetables grown in a controlled environment.

**Keywords:** *Mentha spicata*, LED, Controlled condition, Leaf morphology, Light quality

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## Phytochemical Constituents of *Salvia hydrangea*.

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*Salvia* (sage), the largest genus of the Lamiaceae family, with over 1000 species found throughout the world is one of the most important medicinal genera among this family. Plants of the genus *Salvia* have been reported to be used for the prevention and treatment of various diseases and ailments including antibacterial, spasmolytic, hemostatic, and many others. The Iranian endemic medicinal plant, *S. hydrangea* DC. ex Benth., with the Persian name "Gol-e Arooneh" were used as anti-inflammatory, antispasmodic, carminative, and sedative. Sages are rich sources of terpenoids especially in abietane and labdane and tanshinone type diterpenoids with diverse biological activities such as antimicrobial, antioxidant, cytotoxic, antiprotozoal etc. Here, we have investigated the dichloromethane (DCM) extract from roots of *S. hydrangea* for its diterpenoids content. The roots of *Salvia hydrangea* were collected from Fars province and was extracted in DCM. The chromatography separations were performed using open and flash column chromatography using silica gel 60 (0.063-0.200 and 0.040-0.063mm particle size, respectively). Further purifications have been performed using reversed phase analytical and preparative high pressure liquid chromatography (HPLC). The DCM extract was subjected to open column chromatography over silica gel. The elution of the column was performed using non polar solvent (*n*-hexane) to semi polar (ethyl acetate) and then followed by increasing the polarity of the mobile phase with MeOH to afford 31 fractions. Similar fractions were combined based on their similarity in compositions, deduced from Thin Layer Chromatography analysis. Fractions 8 to10 were mixed and subjected to FCC, A red crystal structure was obtained from this fraction. Fractionation on F8-11 by preparative HPLC, C<sub>18</sub> column, was afforded pale yellowish gum. Yellowish crystals were acquired from mixing of the fractions F14 to F17. The structures of isolated compounds were elucidated using spectroscopy methods including <sup>1</sup>H NMR, <sup>13</sup>C NMR, and EI-MS and by comparison of their spectra with those published in the literature for the authentic samples. All purified compounds have abietane-type structure. Cytotoxic activity of DCM extract from roots of *S. hydrangea* was assessed on two human cancer cell lines including MOLT-4 (human leukemia) and MCF-7 (breast cancer) cells with the MTT assay.

**Keywords:** Lamiaceae, *Salvia hydrangea*, Abietane diterpenoids

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## The Effect of *Zingiber officinale* Extract on Growth of *Trichomonas gallinae*.

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The use of Chemotherapy for the treatment of parasitic disease of man and animals can be problematic due to different adverse effects. As a result, there is an increasing interest in non-chemical alternatives, such as medicinal plant extracts as new therapeutic tools against these diseases. This study was designed to evaluate the antitrichomonal effect of *Zingiber officinale* extract against *T. gallinae*, *in vitro*, as well as comparing it to that of metronidazole. *T. gallinae* were collected from infected free-living pigeons. The *in vitro* assay was performed using multi-well plates containing test compounds in final concentrations of 5, 10, 25, 50 and 100 µg/ml. The 24 h minimum inhibitory concentration (MIC) of *Zingiber officinale* extracts was 25 µg/ml while that of metronidazole was 50 µg/ml. The results of the present study suggested *Zingiber officinale* extract is potent natural antitrichomonal agents. In addition, it is concluded that *Zingiber officinale* is as efficient as metronidazole in inhibiting the growth of *Trichomonas gallinae* trophozoites in culture.

**Keywords:** *Zingiber officinale*, *in vitro*, *Trichomonas gallinae*

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## Investigating the Effect of Titanium Dioxide Nanoparticle on Antioxidant Activity and Total Phenol Content of *Dracocephalum kotschy*.

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*Dracocephalum kotschy* Boiss (Labiatae) is an herbaceous, perennial and endemic plant known in Iran as Badrandjboie-Dennaie and Zarrin-Giah. Recent pharmacological studies have confirmed some of the methoxylated flavonoids in plant's parts having anti-cancer properties. This herb is traditionally used to treat Rheumatoid arthritis and Low Back Pain. Reducing natural habitats and increasing laboratory costs in the chemical synthesis of pharmaceuticals has led to cell and organ culture techniques and their improvement by genetic engineering be the suitable method for the production of pharmaceutical drugs and mass production of these compounds. Hairy root culture system is a good alternative for increasing the production of compounds with medicinal value compared to other methods such as callus culture and cell suspension. The use of biotic and abiotic elicitors is a common strategy that is used to increase the growth rate and production of secondary metabolite in hairy root systems. For this purpose, we established a hairy root culture of *D. kotschy* by infecting 1-month-old leaf explant with *Agrobacterium rhizogenes* 15834 and effects of different concentrations of Titanium dioxide nanoparticle (10, 20, 30, 50 mg/l) for different exposure times (24 and 48 72 h) were studied on antioxidant activity and total phenol content of hairy roots. Polymerase chain reaction (PCR) analysis with specific primers for *rolB* gene confirmed the present of *rolB* in putative transgenic hairy roots. Antioxidant enzyme activity was significantly increased in induced hairy roots compared to nontransgenic roots. The highest phenol content was achieved with 20 and 50 mg L<sup>-1</sup> TiNPs at 48 and 24 h of exposure time, respectively.

**Keywords:** *Dracocephalum kotschy*, Elicitation, Hairy root, Titanium dioxide nanoparticle

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## Comparison of the Chemical Components of the Essential Oils of *Zataria multiflora* Boiss. Two wild Populations Growing in Iran

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*Zataria multiflora* Boiss. is belonging to the Lamiaceae family that grows wild in Iran. The aim of this study was investigation of the chemical composition of essential oils from floral branches wild growing populations of *Zataria multiflora*. Floral branches were collected from their natural habitats in Esfahan and Yazd provinces. The oils were obtained by hydrodistillation and were analyzed by gas chromatography (GC) and GC-mass spectrometry. The essential oil yields of populations were ranged 2.54% (Yazd) to 3.3% (Esfahan) based on the dried plant material. 27 compounds in yazd and 24 in Esfahan, which, were identified in the essential oils. Carvacrol and Thymol were the two major components in the essential oils of populations. Essential oils of Yazd populations with 62.1%, had the highest amounts of Carvacrol.

**Keywords:** *Zataria multiflora* Boiss., Carvacrol, GC-mass spectrometry

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## Use of Medicinal Plants in the Treatment of Aquatic Diseases

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Medicinal herbs are used in many cases. Many herbs and plants have been used in many cultures around the world for both human and animals as well as fish. *Aeromonas hydrophila* is one of the bacteria responsible for causing aquatic disease and diseases of fishes caused by *Aeromonas* spp. are common, have broad host ranges and may cause high mortality. The use of antimicrobial drugs in aquacultures could lead to emergence of resistance in pathogenic microorganisms. The aims of this study were to investigate the in vitro antibacterial activity of the essential oils (EOs) of *Allium sativum* and *Ocimum* as well as, the potential of these products to be used in rainbow trout infected with *Aeromonas hydrophila* (ATCC7965). Minimum Bactericidal Concentration (MBC) of Garlic Extract was 2 mg/ml and for *Allium sativum* was 0.5 mg/ml. Minimum Inhibitory Concentration (MIC) of Garlic Extract was 1 mg/ml and for *Allium sativum* was 0.25 mg/ml. This study showed, allicin in the garlic plant has a stronger antibacterial effects.

**Keyword:** *Aeromonas hydrophila*, *Allium sativum*, *Ocimum*, Rainbow trout

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## A Comparative Study on Phenolic Acid Profiles in Leaves and Roots of Eleven Wild Populations of *Salvia leriifolia* Benth. from Iran

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*Salvia leriifolia* Benth. (Lamiaceae) is a perennial herbaceous plant, which has been used for different purposes in traditional as well as modern medicine. This plant grows as wild populations in Khorasan and Semnan provinces of Iran and some parts of Afghanistan. Unlike other species of *Salvia* genus, the chemical constituents of *S. leriifolia* are not well known however recently the existence of some phenolic acids such as rosmarinic acid, salvianolic acid B and caffeic acid have identified in this species. Phenolic acids and their derivatives are medicinally important plant metabolites. The present study was aimed to investigate the variations in phenolic acids content of eleven populations of *S. leriifolia*. Mature seeds were collected from wild grown plants in different areas of Khorasan (Razavi, South) and Semnan provinces. The seeds were planted in plastic pots containing coco peat. Seedlings at the four-leaf stage were transferred to 8 kg plastic pots filled with garden soil, coco peat perlite and sand (1:1:1 w/w). The plantlets with 28 leaves were harvested and dried at room temperature. The dried samples were extracted with methanol (80%) by cold maceration and then were analyzed for five individual phenolic acids (rosmarinic acid, salvianolic acid A, salvianolic acid B, lithospermic acid and caffeic acid) by HPLC method. The highest contents of rosmarinic acid (4.46 mg/g DW), salvianolic acid A (0.275 mg/g DW) and lithospermic acid (1.13 mg/g DW) were measured in the leaves of Sarogh population, however the leaves of Helali population were rich (3.27 mg/g DW) in salvianolic acid B. The maximum level (5.64 mg/g DW) of caffeic acid was detected in the roots of Torbat population. Our results showed that different populations had different potential for the production of phenolic acids. Sarogh, Helali and Torbat populations were highly recommended, as good sources of phenolic acids, for further evaluation of their potential to produce phenolic compounds.

**Keywords:** Caffeic acid, Population, Rosmarinic acid, Salvianolic acids, *Salvia leriifolia*

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## Anti-Fungal and Anti-Bacterial Effect of Essential Oil of *Zhumeria majdae*

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*Zhumeria majdae* Resh. f. & Wendelbo. is the member of monotypic genus (*Zhumeria*) from Menthaeae family. The exclusive habitat of this plant is southern Iran (near the Persian Gulf) and the plant commonly grows on bare rocky slopes. This plant has a wide spectrum pharmaceutical properties such as antinociceptive and anti-inflammatory (and antiangiogenesis). In this study, we investigated the Anti microbial effect of essential oil of this plant. Three bacteria strain (*Escherichia coli* ATCC 25922, *Staphylococcus aureus* ATCC 33591, and *Staphylococcus aureus* ATCC 12600) were used for disk diffusion assay anti-bacterial test. In addition, inhibitory effect on growth for three fungi (*Chaetomium globosum*, *Penicillium funiculosum*, *Fusarium graminearum*) was examined. All microorganisms showed susceptibility to essential oil of *Z. majdae*. The most susceptible bacterium was *E. coli* (20 µl). Among the fungi, *C. globosum* showed lowest growth rate in present of essential oil.

**Keywords:** Anti-bacterial, Anti-fungal, Essential oil, *Zhumeria majdae*

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## Comparison of Quantitative and Qualitative Changes of Essential Oil of the *Nepeta Cephalotes* Boiss in Fresh and Dehydrated Organs.

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*Nepeta cephalotes* Boiss. is the exclusive species of Iran, distributed in the of Irano-Turani region.(1,2) The purpose of this study was identify the chemical composition of essential oils of these species in fresh and dry conditions. Essential oils of the flowering plants in two cases, fresh and dried were extracted by Clevenger distilled water. The essential oil yield, were calculated, and by using the chromatographic (GC) and gas chromatography (GC-MS) spectrometers, The chemical compound were identified. The results indicated that the yield of essential oils of this species dry condition was higher than fresh condition. In *Nepeta cephalotes* 17 compounds were identified that 4aa, 7a, 7aa neptalactone ( wet 43%, dry 64%) had the highest amount.

**Keywords:** *Nepeta cephalotes*, Essential oil, Nepetalactone

**References:** [1] Rechnering, K.H., 1982. *Nepeta* (Labiatae) in Rechnering Flora Iranica. Akademische Druck-U, Verlagsanstalt, Graz-Austria, 150: 108-216.

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## The Effects of Dilution Rates of *Artemisia (Artemisia incana)* Aqueous Extract on Sperm Motility after Freezing-Thawing.

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Artificial insemination as an assisted reproductive technic is important in veterinary and medical sciences. This technic includes semen collecting and insemination to recipient. Sperm frizzing is the main tool of the artificial insemination with an important role in long term storage. Semen cryopreservation has negative effects on sperm motility that leads to low fertility of the sperm. This experiment was carried out to study of antioxidant effect of different levels of *Artemisia* aqueous extract dilution rate on motility properties of ram sperm. In this study, semen samples were collected from four rams using artificial vagina. Different levels of *Artemisia* aqueous extract (0 (as control group), 4, 8 and 12 ml per dl diluent solution) were added to egg yolk-citrate diluent and frozen then stored in the liquid nitrogen until evaluation. Sperm evaluation of motility properties (including: Progressive Velocity (VSL), Track Velocity (VCL), Straightness motility (STR), Lateral Amplitude (ALH) and Beat Frequency (BCF) of sperm head) was carried out by computer assisted sperm analysis (CASA). There were significant differences in VCL, VSL, ALH, STR and BCF in group 4 ml/dl extender versus other experimental groups (P<0.05). In spite of higher VCL, VSL, ALH and BCF in control group (P<0.05) than groups 8 and 12 ml/dl extender but there were no substantial differences between 8 and 12 ml/dl extender in mentioned parameters. It seems addition of 4 ml *Artemisia* extract in semen extender resulted in better performance in viability, motility and membrane protection.

**Keywords:** Sperm motility, *Artemisia* extract, Natural Antioxidant

Table 1. effects of dilution rates of *Artemisia* aqueous extract on sperm motility after freezing-thawing

	VCL (µm/s)	VSL (µm/s)	ALH (µm)	STR (%)	BCF (Hz)
Con	121.53 <sup>b</sup>	52.19 <sup>b</sup>	3.63 <sup>b</sup>	51.6 <sup>d</sup>	8.29 <sup>b</sup>
4 ml/dl	136.83 <sup>a</sup>	67.39 <sup>a</sup>	3.93 <sup>a</sup>	61.9 <sup>a</sup>	8.89 <sup>a</sup>
8 ml/dl	113.78 <sup>c</sup>	46.46 <sup>c</sup>	3.42 <sup>c</sup>	54.4 <sup>c</sup>	8.09 <sup>c</sup>
12 ml/dl	112.48 <sup>c</sup>	44.39 <sup>c</sup>	3.43 <sup>c</sup>	59.7 <sup>b</sup>	8.1 <sup>c</sup>
SEM	1.032	1.011	0.039	0.7	0.058
P-Value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

A different letter within columns indicates a significant difference (P=0.05).

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**Silymarin, Olibanum, and Nettle, a Mixed Herbal Formulation in the Treatment of Type II Diabetes: a Randomized, Double-Blind, Placebo Controlled, Clinical Trial**

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*Silybum marianum* (L) Gaertn (milk thistle) seeds, *Urtica dioica* L (nettle) leaves, and *Boswellia serrata* (olibanum gum) resin are used traditionally by Iranian diabetic patients. The aim of this study was to evaluate the antihyperglycemic effects of these herbs in an herbal formulation in patients with type II diabetes mellitus. Sixty patients diagnosed as type II diabetes mellitus with fasting blood glucose level from 150 to 180 mg/dL, glycosylated hemoglobin level from 7.5% to 8.5%, and on oral antihyperglycemic drugs, were allocated to receive the mix herbal formulation or placebo for 90 days in a double-blind randomized placebo-controlled clinical trial. The mean serum fasting blood glucose, glycosylated hemoglobin, and triglyceride in the herbal drug group were significantly less than placebo group's values after 3 months of the intervention. The study showed a potential antihyperglycemic and triglyceride lowering effect of the herbal formulation, while it did not have any significant cholesterol or blood pressure lowering effect.

**Keywords:** Diabetes mellitus, *Silybum marianum* (L) Gaertn, Traditional Persian medicine

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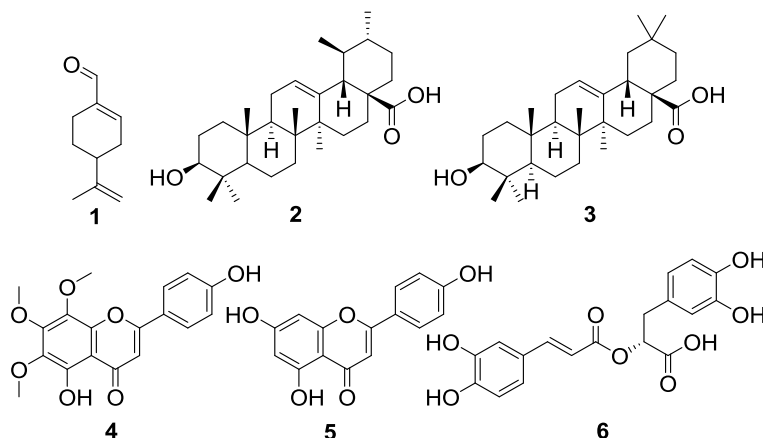
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**Phytochemical Investigation of *Dracocephalum subcapitatum* by HPLC-PDA-MS.**

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*Dracocephalum subcapitatum* (Lamiaceae) is aromatic growing wild in the northern part of Khorasan Province, Iran. The plants from genus *Dracocephalum* are important for its biological and pharmacological properties. It has been used as a medicinal herb for curing headache, liver and stomach disorder, anti-bacterial, anti-cancer and immunomodulatory [1]. In this project, the plant collected from Khorasan Province and extracted by maceration using sequential solvents hexane, ethylacetate, methanol and methanol/water (50:50). All extracts were analyzed by HPLC-PDA-ESIMS and the compounds identified by comparing with previously published data by using UV and MS spectra. Among the extracts, the ethyl acetate extract of *D. subcapitatum* subjected for silica gel column chromatography and 17 fractions were obtained. The final purification resulted on isolation and structure elucidation of several compounds by applying 1D and 2D NMR experiments. The major compounds in the ethyl acetate and methanolic extracts identified namely as, perillaldehyde (1), ursolic acid (2), oleanolic acid (3), xanthomicrol (4), apigenine (5) and rosmarinic acid (6). In addition, the essential oil from plant was obtained by hydrodistillation and analyzed with gas chromatography-mass spectrometry (GC/MS), the major compounds of essential oil were: perillaldehyde, limonene, limonene-10-ol.



**Keywords:** Lamiaceae, Extract, HPLC, Anti-cancer, Flavonoids, Essential oil

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**Methyl Jasmonate Enhances the Accumulation of Phenolic Acids in *Salvia virgata* Jacq. Hairy Root Cultures.**

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*Salvia virgata* Jacq., a medicinally important plant belonging to the Lamiaceae family, is commonly used for the treatment of skin diseases, wound and blood cancer [1]. Phenolic acids, especially rosmarinic acid (RA), are the most important and valuable compounds in this species. The present study was aimed to investigate the effect of methyl jasmonate (MeJA) on the production of rosmarinic acid, salvianolic acid A (sal-A) and caffeic acid (CA) in *S. virgata* hairy root cultures. Leaf explants were inoculated with *Agrobacterium rhizogenes* strain ATCC 15834. The infected explants cultured on solid hormone-free MS medium in the dark for 48h at 25 °C. To prove the transformed nature of hairy root lines, PCR-analysis was performed with the use of primers designed for *rolC* gene. The hairy root line C was selected for further studies based on its growth performance and RA accumulation. In order to increase phenolic acids production, two concentrations (50 and 100 µM) of MeJA were added to 55-day-old hairy root cultures. The hairy roots were harvested 1, 3 and 5 days after elicitor treatment. The optimum exposure time of roots to elicitor for enhancing phenolic acids biosynthesis was achieved 3 days after elicitation with MeJA. The maximum contents of RA (18.45 mg/g DW), sal-A (2.11 mg/g DW) and CA (2.61 mg/g DW) were obtained in hairy roots treated with 100 µM of MeJA on 3th day of elicitation. In conclusion, hairy root culture could be considered as a beneficial tool for producing the valuable phytochemicals, like phenolic acids, in *S. virgata*.

**Keywords:** *Agrobacterium rhizogenes*, Caffeic acid, Rosmarinic acid, *Salvia virgata*

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**In Vitro Callus Induction in Various Seedling Explants of *Haplophyllum Virgatum* Var. *Virgatum***

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The genus *Haplophyllum* (Rutaceae) grows naturally around the Mediterranean section of Europe and in Western Asia up to Siberia and have about 70 species worldwide. Iran with 26 *Haplophyllum* species out of which 14 are endemic, has the highest number of this genus and can be considered as a center of speciation of this genus. The common Persian name of the genus is "Sodaby". Many species of this genus are used in traditional medicine for the treatment of herpes, warts, stomachache, erysipelas, toothache, skin diseases and in the treatment of testicular cancer. The presence of essential oils, alkaloids, fixed oils, coumarins, sterols, flavonoids and lignans have been reported from different species of the genus. Callus induction in different seedling explants (leaf, shoot and root) by two plant growth regulators (PGRs) were investigated here. *H. virgatum* seeds were surface sterilized and germinated on B5 medium. Explants were obtained from *in vitro* grown up seedlings after 40 days and the gained explants cultured in B5 medium supplemented with kinetin (0.1, 0.2 and 0.5 mg/L) in combination with NAA (1 and 2 mg/L) then incubated in darkness at 25°C. Different callus induction percentages were observed in all employed PGR treatments in all cultured explants after two months. This is the first report of *in vitro* culture of *H. virgatum* var. *virgatum* as an Iranian endemic plant.

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### Extraction and Identification of Four Flavonoids from Acetone Extract of *Salvia sharifii* Rech. f. & Esfand.

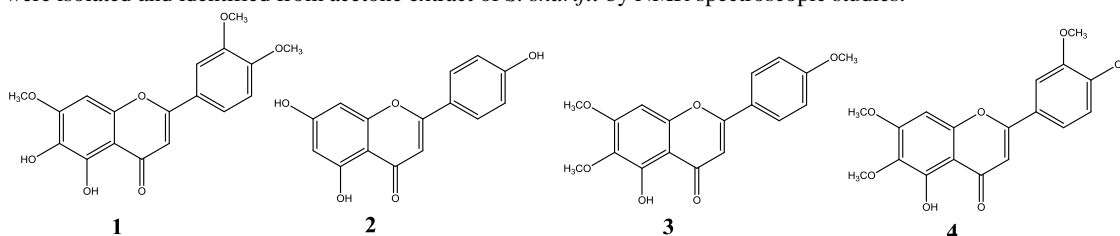
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*Salvia sharifii* Rech. f. & Esfand. (Lamiaceae) is an endemic plant which is found only in south of Iran. This plant is extensively exploited as a medicinal plant and called “Maryam-Goli Jonooobi” in Persian language [1]. Different preparations of this plant e.g., decoctions, infusions and powders, are used in traditional medicine as antiseptic, carminative, digestive and analgesic. Significant antibacterial, cytotoxic and antioxidant potential of *S. sharifii* has also been identified. Up to now, two flavones, ladanein and 6-hydroxy-5,7,4'-trimethoxyflavone and one labdane-type diterpene, ent-13-epi-manoyloxiolide, were isolated from the aerial parts of this plant [3]. On the basis of reported traditional uses of *Salvia sharifii*, we carried out current phytochemical research to explore the plant on scientific grounds. In the present phytochemical study, four secondary metabolites (1-4), were isolated and identified from acetone extract of *S. sharifii* by NMR spectroscopic studies.



**Keywords:** *Salvia sharifii* Rech. f. & Esfand., flavonoid, acetone extract, Lamiaceae

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### Isolation and Characterization of a Secondary Metabolite from Acetone Extract of *Salvia mirzayanii* Rech. f. & Esfand.

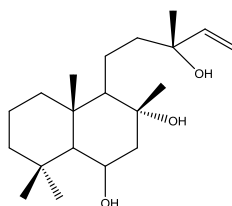
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*Salvia* is represented by 56 species in the flora of Iran and nearly one third of those are endemic. One of the well-known endemic species of Iran is *Salvia mirzayanii* Rech. f. & Esfand. *Salvia mirzayanii* is growing in central and southern parts of Iran as a biennial or perennial flowering herb approximately 25 to 40 cm high with blue flowers. Known as Iranian Sage, Moor-e-Talkh, or “Marv-e-Talkh” in local areas, the herb is traditionally administered for the management of various disorders. Folk practitioners and local healers usually have reported the effectiveness of *Salvia mirzayanii* in diabetes, spasms, gastrointestinal disorders, infections, and inflammations. In addition to these applications, *Salvia mirzayanii* is still used as an astringent and tonic in Iranian folk medicine. Several investigations have been performed on the chemical constituents as well as on pharmacological properties of *Salvia mirzayanii*. Fractionation of an acetone extract of the aerial parts of *Salvia mirzayanii* led to the isolation of compound (1), whose structures were determined by 1D and 2D-NMR spectroscopic studies, in particular homo-COSY and hetero-(HMQC and HMBC).



**Keywords:** *Salvia mirzayanii* Rech. f. & Esfand., Diterpene, Moor-e-Talkh, 2D-NMR

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## Study of Phytochemical and Medicinal Properties of *Cardiospermum halicacabum* Seeds.

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*Cardiospermum halicacabum* Linn (Sapindaceae) is a climber plant with medicinal properties which has been mentioned in the various traditional system of medicine, it is known as balloon plant or love in a puff. Macroscopic and microscopic characters of *Cardiospermum halicacabum* seeds and phytochemical analyses of its extracts evaluated. Anti-oxidant properties and cytotoxicity effects of extracted materials also have been tested by using different *in-vitro* assays and compared with the selected standard drugs for each assay. Unique characters of seeds and its powder, as well as various secondary metabolites in *Cardiospermum halicacabum* seed, identified. Biological assay of seed extracts proven the potential anti-oxidant and anticancer activity of main collected extract; result showed the growth inhibition value (GI50) of 12.8 µg/ml and < 10 µg/ml for *Cardiospermum halicacabum* seeds. Important information collected and conclusion highlighted special characters for standardization of *Cardiospermum halicacabum* seeds as well as the suggestion of its medicinal importance that can be carefully chosen for more research in different field.

**Keywords:** Anti-oxidant, Cytotoxicity, Phytochemical

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## Quantitative and Qualitative Analysis of Triterpenic Acid Contents in Mistletoe Settled on *Parrotia Persica* C.A.Mey. of Hyrcanian Forests.

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Mistletoe (*Viscum album* L.) from the Viscaceae family is a hemiparasite plant and it is known as branch parasite. The extract of *V. album* containing triterpenic acids including: oleanolic, betulinic and ursolic acid has antioxidant properties and is effective in acute lymphoblastic and myeloid leukemia and induces apoptosis of murine melanoma cells [3]. This species grows in Iran on various tree species as well as settle on an endemic species of Hyrcanian Forests: *parrotiapersica* (Persian Ironwood). The aim of this study is investigating the amount of triterpenic acid contents in mistletoe settled on this important endemic species. In this work, Mistletoe was collected from three Ironwood individuals (three replications with same ecological conditions) in full flowering stage in Daeiz forests of western Haraz in central Hyrcanian forests of Iran, and then extracted with ethyl acetate solvent and injected into the High Performance Liquid Chromatography (HPLC) for analysis. The results of the analysis indicated that the extract contains 1.46 mg/gr of dry weight of betulinic and 10.31 mg of oleanolic acid, and the ursolic acid wasn't detectable, illustrating that the analysis results of triterpenic acid contents of mistletoe organs settled on *parrotiapersica* in Hyrcanian forests of Iran was very similar quantitatively and qualitatively to the results of triterpenic acids analysis of mistletoe organs settled on broadleaf deciduous tree species of Poland forests in research done by Wójciak-Kosior et al, 2017.

**Keywords:** *Viscum album* L., Triterpenic acid, Hemiparasite, *Parrotiapersica* C.A. Mey

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## Healthy People Eat More Sanguine Producing Foods than Depressed one: a Case-Control Study

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Depression is one of the most frequent health problems in recent decades. Accumulating evidence indicates the considerable prevalence of this disorder in both developed and developing countries, in particular in high risk groups including military forces. To reduce the risk of depression, Iranian traditional medicine (ITM) suggested eating more sanguine producing (Movalled-e Dam) foods (SPF) instead of black bile producing foods (BPF). The aim of this study was to investigate the relationship between the consumption of SPF/ BPF and depression. 100 healthy and 100 depressed male participants from Iranian military forces were entered to the study. The mood condition of each group was determined based on the psychiatrist diagnosis and also Beck depression inventory. Comorbidities including diabetes, gastrointestinal, and cardiac diseases, and also the status of marriage, education, income, and cigarette smoking of participants were asked. Food intakes during the past year were collected via a semi- quantitative 137-item food frequency questionnaire. Taking a SPF dominant regimen was associated with substantially lower rate of depression [OR=0.65(0.48 to 0.87), P=0.003]. This relationship was independent of age, marriage, income and education but turned non-significant when smoking was taken into account. This means smokers took less SPF (OR=0.74, P=0.001) compared to non-smokers. Among SPF, Healthy participants consumed more amounts of lime, apple, pear, strawberry, pomegranate, watermelon, almond, pistachio, and lamb (p<0.05). Healthy people have more adherences to ITM-recommended foods, thus, consumption of these items may prevent depression.

**Keywords:** Major depressive disorder (MDD), Nutrition, Iranian traditional medicine

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## Evaluation of the Effects of Hydroalcoholic Extract of *Brassica oleracea* (Broccoli) on Estradiol Valerate-Induced Polycystic Ovary Syndrome (PCOS) in Female Wistar Rats

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Polycystic ovary syndrome (PCOS) is an endocrine-metabolic disorder and its characteristic features are increased androgen, hirsutism, oligomenorrhea, amenorrhea, anovulation, and infertility. In this disease, obesity and increased body fat is commonly seen and that is why its treatment is quite difficult. Therefore, the aim of this study was to determine the effects of hydroalcoholic extract of *Brassica oleracea* (broccoli) on estradiol valerate-induced polycystic ovary syndrome (PCOS) in female Wistar rats. In this experimental study, 15 female Wistar rats were divided into three groups (five rats per group) and placed in separate cages during the study. The groups were as follows: control group, the PCOS group, and one experimental group. For the induction of PCOS in the one experimental and PCOS group, the estradiol valerate injected 40 mg/kg/rat (0.4 ml) intramuscularly. After induction of PCOS (63 days), one experimental group was treated with intraperitoneal injection of *Brassica Oleracea* (broccoli), 100 mg/kg, for 28 days. Also, the control group was received 0.4 ml/rat of sterile normal saline through the intramuscularly for 28 days. At the end of the study, the animals were anesthetized by ether inhalation. The animals were killed by cardiac puncture after thoracotomy. Then, ovaries tissues were carefully removed, rinsed in saline, fixed in formalin fixative solution (10%), embedding in paraffin, cut in 5um sections, and stained by haematoxylin and eosin. The number of primary, Graafian follicles and corpus luteum significant increased in PCOS group compared with control group (p<0.05). Also, the numbers of Graafian follicles and corpus luteum significant decreased in the one experimental group compared with PCOS group (p<0.05). The results of this study showed that the broccoli can improve the symptoms of PCOS.

**Keywords:** Polycystic ovary syndrome, *Brassica Oleracea*, Estradiol valerate

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## Royandiaherb 1092 Promotes Proliferation In Pancreatic Derived Islet Cells.

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Type I diabetes mellitus (T1DM) is a metabolic disorder caused by progressive loss of pancreatic beta-cells. Although T1DM is manageable, beta cell failure is progressive and no efficient replacement of the lost beta-cell mass has yet been found. Preservation and expansion of pancreatic beta cell mass could be an effective therapeutic approach. However, This approach is challenging since beta-cell regeneration ability is very low and it is considered as a quiescent cell type. One recent approach in several studies has been to introduce small molecules in order to induce proliferation of beta-cells or to increase its mass through stimulation of proliferative signalling pathways. Such studies can lead to discovery of new anti-diabetic drugs. Moreover, there are about 1200 plants with claims that they contain compounds with anti-diabetic properties and growing evidence that herbal extracts can affect beta-cell expansion. Recently, more researchers have been focusing on these plants to elucidate mechanism of action for their active compounds. In this study, we developed an in-vitro model to study regenerative effects of herbal extracts on pancreatic derived islet cells. Then, we investigated proliferation effects of one extract named RoyanDiaHerb 1092 (RDH) using this model. For extraction, the RDH plant was collected from the research field of Faculty of Agriculture, Tarbiat Modares University and then dried in shadow, and 10 g of crushed material was sonicated for 30 min in 50:50 water and ethanol to obtain extracts. Islets were isolated from rat pancreas tissue using our well-established protocol. Islet cells were dissociated by trypsin and cultured with a defined cell density in 96-well plates. Cells were cultured overnight in Ham's F10 supplemented by fetal bovine serum at 37°C and 5% CO<sub>2</sub>. The RDH extract was then added to islet-derived cells' media at different concentrations (30, 100, 1000 and 10000 mg/ml) for 6 days. After that, treated cells were immuno-stained by anti-insulin and anti Ki67 antibodies and were imaged. Finally, the percentage of both insulin+ and Ki67+ (insulin+/Ki67+) cells of treated groups were measured and compared to the controls (non-treated and sham groups). The result showed significant increase in the ratio of insulin+/Ki67+ cells in the cells treated with 30 to 1000 µg/ml RDH extract comparing to the negative control groups. While further characterization and more in-vivo experiments needed to confirm the regenerative effects of RDH extract in beta-cells, our data reflect a promising therapeutic ability for RDH to treat T1DM.

**Keywords:** Beta cell, Proliferation, Herbal extract

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## Effect of Moisture Stress and Different Salicylic Acid Concentrations on Qualitative Characteristics and Seed Yield *Nigella sativa* L

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The effect of drought stress and different concentrations of salicylic acid on qualitative characteristics and Seed yield of *Nigella sativa*, experimental research farm in 2016 in the College of Agriculture and Natural Resources, Islamic Azad University Karaj Branch was conducted. With split plot in a randomized complete block design with three replications. The main factor irrigation regime on 5 levels: irrigation, irrigation at stem elongation stage (end of period re-watering to grow), irrigation at heading stage (end of period re-watering to grow), irrigation in 50% flowering stage (end of period re-watering to grow), irrigation at grain filling stage start (irrigation until the end of growth period) and sub-plots foliar application of salicylic acid with 4 levels 0, 3, 6 and 8 mM in Tuesday stem elongation stage, start budding and flowering 50% was applied. The results showed that drought stress at different growth stages have a significant effect on yield of black seed; The highest grain yield from full irrigation was obtained with an average of 700.32 kg. The use of salicylic acid under drought conditions, yield components, and seed yield had a positive effect on grain yield of foliar application of salicylic acid at a concentration of 6 M with an average of 656.53 kg of oil per hectare and the highest percentage of foliar 8 M Most oil accounted for an average of 0.18 percent [1,2].

**Keywords:** Essential oil content, Oil content, Irrigation

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## Comparison of Drug Yield, Antioxidant Activity, Phenol, Flavonoids, and Essential Oil Content of some Thymus Species in Greenhouse Conditions

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The genus *Thymus* (belonging to the family Lamiaceae) consists of 928 species, native to Europe, and grown in the Mediterranean basin and northern Europe, as well as other parts of the world such as Asia, South America, and Australia (1). The genus *Thymus* exhibit a long list of pharmacological properties such as antioxidant, antibacterial, antifungal, antiviral activities, cytotoxicity, antiparasitic and so on (1,2). Cultivation of genus *Thymus* plants is considered as an interesting possibility for providing additional agricultural revenue for farmers, due to their wide use in the food, cosmetic, and pharmaceutical industries (1). The objective of the present study was to select valuable Thyme species (*Thymus serpyllum*, *Thymus citriodorus* and *Thymus vulgaris*) according to the productivity of biomass, antioxidant activity and some phytochemicals for the greenhouse cultivation. A greenhouse experiment was conducted based on completely randomized design with three replications. By comparing the three tested species, the highest drug yield was observed in *Th. serpyllum* and *Th. vulgaris* plants (22.57 and 22.44 g/plant, respectively). But, total phenols, flavonoids and antioxidant activities of *Th. citriodorus* and *Th. serpyllum* were higher than those of *Th. vulgaris*. The highest essential oil percentage was obtained by *Th. citriodorus* (0.65 w/w). Nevertheless, essential oil yields of *Th. serpyllum* and *Th. vulgaris* (0.125 and 0.1 g/plant, respectively) were significantly higher than those obtained from *Th. citriodorus* plants (0.075 g/plant). In conclusion, we established that *Th. serpyllum* is more suitable for the greenhouse cultivation than other tested species, because can grow more dried total drug yield, shows highest antioxidant activity and synthesize higher amounts of phenols and flavonoids with highest essential oil yield.

**Keywords:** *Thymus*; Antioxidant; Phenol; Flavonoid; Essential oil

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## Potential Role of Arbuscular Mycorrhizal Fungi in the Accumulation of Polyphenols in *Melissa officinalis* L.

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Lemon balm (*Melissa officinalis* L.), an important medicinal herb belonging to the family Lamiaceae, has been used as far back as the Middle Ages to improve human health and to cure various diseases. It has now been proven that a number of the medicinal properties of this plant are due to the presence of polyphenolic constituents, the most prominent of which is rosmarinic acid (RA). Arbuscular mycorrhizal fungi (AMF) are the oldest and most prevalent mutualistic symbiosis. Association of AMF with medicinally important plants not only promotes the plant growth, but also improves the productivity of valuable secondary metabolites like phenolic compounds. The purpose of this study was to examine the effect of AMF on the content of some nutritional/pharmaceutical phenolic compounds in lemon balm. Experiments were carried out using a randomized complete block design in three replications included four mycorrhizal treatments [un-inoculated plants, plants inoculated with *Glomus mosseae*, plants inoculated with *G. intraradices* and plants inoculated with mixed inoculum (*G. mosseae* + *G. intraradices*)]. Seeds were sown in a mixture of soil: fungal inoculum (10:1 w/w). The percentage of root colonization was measured in four months old plants. Extraction of phenolic compounds was performed by methanol (80%) in an ultrasonic bath. The total contents of phenols (TP), flavonoids (TF), anthocyanins (TAC) and phenolic acids (TPA) in the extracts were measured using the spectrophotometric method. The concentrations of RA and salvianolic acid B (SAL B) in the extracts were also determined by HPLC method. The highest percentage of colonization (59/697%) was observed in the roots of plants inoculated with *G. mosseae*. Treatment of the plants with *G. mosseae*, *G. intraradices* and mixed inoculum (*G. mosseae* + *G. intraradices*) resulted to the increased levels of all examined phenolic compounds. The maximum amounts of TP (51/705 mg GAE/g Dw), TF (14/795 mg QE/g Dw), TAC (21/121 μM/g Fw) and TPA (0/05385 mg RAE/g Dw) as well as RA (5/196 mg RA/g Dw) and SAL B (7/365 mg SAL B /g Dw) were found in the plants treated with *G. mosseae*. Our results showed that successful colonization of *M. officinalis* with AMF increased the amounts of health promoting-phenolic compounds that improved the nutritional and medicinal values of the plant for human health.

**Keywords:** Arbuscular mycorrhiza, *Glomus mosseae*, Lemon balm, Phenolic compounds

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**Effect of Different Levels of Nanoemulsion of Fennel Essential Oil on Energy and Protein Efficiency Ratios of Broiler Chicks under Heat Stress.**

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Essential oils (EOs) are natural compounds with antioxidant, and antimicrobial properties. Despite their potential applications as functional components in foods and animal feeds, the utilization of EOs is often limited because of their relatively low water solubility, high vapor pressure, and physical and chemical instability. One of the mechanisms which can minimize these undesirable effects is to use of their nanoemulsion. Nanoemulsion can increase the stability of volatile compounds, protects them against interactions with other compounds, and increases antimicrobial properties by increasing cellular absorption. *Fennel (Foeniculum vulgare)* is one of the most common herbs in the world that is used as food and feed additive with antioxidant effects, and can alleviate adverse effects of heat stress. Therefore, the present experiment was carried out to determine the effect of different levels of nanoemulsion of fennel essential oil on the energy and protein efficiency ratio of broiler chickens reared under heat stress. Two hundred 1-d-old broiler chicks were used in a completely randomized design with 5 treatments and 4 replicates for 42 days. The treatments consisted of control (basal diet with no additive), basal diet and 200 mg/kg fennel EOs and basal diet with 200, 100 and 50 mg/kg of nanoemulsions of fennel EOs. After 3 wk of age, heat stress was induced. The energy and protein efficiency ratios of broiler chickens for the starter, growth, and total periods were calculated. The results of this experiment showed that in starter period, the energy efficiency ratio (EER) of broiler chicken in the groups containing different levels of nanoemulsion, were higher than the control and fennel essential oil groups ( $P \leq 0.05$ ). It was shown that the use of medicinal plants reduces the amount of gastrointestinal microbial contamination, so the rate of protein degradation and amino acids in the digestive tract will decrease and more of them will be absorbed and maintained in the body. The results of this experiment showed that the use of nanoemulsion of fennel essential oil can improve the EER of broiler chicken in starter period. Use of feed additives such as fennel EOs and nanoemulsion of fennel EOs could not alter broiler EER and PER in heat stress situation.

**Keywords:** Fennel essential oil, Broiler, Heat stress, Nanoemulsion

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**Effect of Different Levels of Clove Essential Oil Nanoemulsion on Energy and Protein Utilization of Broiler Chickens Fed Diets Based on Wheat.**

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Antibiotics have been used in poultry nutrition as growth promoters. However, concerns about the development of antimicrobial resistance from animal to human bacteria have led to a ban in the use of these antibiotics in some countries. Nowadays, the possibility of using new natural alternative additives instead of antibiotics is being researched. In recent years, aromatic plants and their extracts have received attention as growth and health promoters. It is known that most of their properties are due to the essential oils (EOs) and other secondary plant metabolites. Clove (*Syzygium aromaticum*) is the aromatic plant and eugenol is the main compound in clove. Clove, and its EOs, has been found effective in poultry to improve growth performance and to control some intestinal pathogens. This study was carried out to determine the effect of different levels of nanoemulsion of clove EOs on energy and protein efficiency ratio of broiler chickens fed diets based on wheat. A total of 280 d-old commercial broiler chicks were distributed randomly into 7 groups with four replicates to receive diets supplemented with 1- any things (control), 2-enzyme, 3- 200 mg/kg of clove EOs and 4 to 7 different levels of nanoemulsion of clove EOs (200, 150, 100, 50 mg/kg) for 42 days. The results of this experiment showed that, in the starter period, energy and protein efficiency ratio decreased by supplementation of diets with nanoemulsion of clove EOs in the levels of 200, 100 and 50 mg/kg when compared with control group ( $P < 0.05$ ). Energy and protein efficiency ratio were not affected by feed additives in grower period ( $P \geq 0.05$ ). In the overall period, the best energy and protein efficiency ratio was obtained by addition of enzyme, and this factors were affected adversely by addition of 100 mg/kg nanoemulsion of clove EOs ( $P < 0.05$ ). The result of this experiment in line by others. Researcher, reported that, at the starter period, chicks refuse to consume the feed when supplemented their diet with clove EOs (2). Therefore, it was concluded that nanoemulsion of clove essential oil inclusion had a negative significant effect on broiler energy and protein efficiency ratio in starter and overall periods.

**Keywords:** Clove essential oil, Broiler, Nanoemulsion

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### Determination of Black Seed (*Nigella Sativa*) Fixed Oil Extracted by Hot Press Method.

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This study was carried out to determine fixed oils in black seed (*Nigella sativa*) using gas chromatography which the health effects and useful compounds of this plant have been reported previously [1]. Oil extraction was performed using hot press procedure which is one of the most common extraction methods. The results revealed that black seed oil contain myristic acid (C 14: 0), palmitic (C 16: 0), palmitoleic (C 16: 1), margaric (C 17: 0), stearic (C 18: 0), oleic (C 18: 1), linoleic (C 18: 2), linolenic (C 18: 3), arachidic (C 20: 0) and gadolace (C 20: 1), behenic (C 22: 0) and erolic (C 22: 1). The highest amount of fatty acids identified linoleic acid (56%). Linolenic acid (Omega-3) and Linoleic acid (Omega-6) are both essential fatty acids (EFA) for the body. This means that the body cannot produce them and must be supply through food [2]. Therefore, black seed oil is a good source of omega-6 to supply body. Palmitic acid (C 16: 0), stearic acid (C 18: 0) and behenic acid (C 22: 0) were the dominant saturated fatty acids. Meanwhile, Linoleic acid (C 18: 2) and oleic acid (C 18: 1) were the deminate unsaturated fatty acids. Aforementioned fatty acids involved 90% of the composition of black seed fatty acids. On the other hand, the ratio of unsaturated fatty acids to saturated fatty acids were 4.11. Palmitic acid consumption can provide antioxidant and anti-atherosclerotic benefits [3].on the other hand, the consumption of palmitic acid along with linoleic acid does not increase cholesterol. Furthermore, stearic acid which was high in black seed oil can decrease LDL cholesterol.

**Keywords:** *Nigella Sativa*, Press Extraction, Fixed Oil, Gas Chromatography

**References:** [1] Atta, M.B. Some characteristics of nigella (*Nigella sativa* L.) seed cultivated in Egypt and its lipid profile, *J. Food Chem.* **2003**; 83, 63-68.

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### Applicability of Start Codon Targeted (Scot) Markers to Evaluate Somaclonal Variation in *Foeniculum Vulgare*.

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*Foeniculum vulgare*(Fennel) is a well known and important medicinal and aromatic plant native to the Mediterranean area. Plant tissue culture is a suitable approach to prepare sufficient amount of plant materials and valuable compounds within a short span of time in large scale. There are many factors such as number of subcultures, explant source, culture medium and exogenous hormones which can induce genetic or epigenetic changes during tissue culture.To evaluate the effects of medium composition on somaclonal variation in Fennel, the genomic DNA of 10 callus samples obtained from different media containing different concentration of BAP, 2,4-D and vermivash were extracted using CTAB method with some modifications. Six SCoT primers were used to estimate genetic diversity among DNA samples. The comparison of banding patterns generated by SCoT primers, revealed the genetic variation among samples due to the tissue culture conditions.This study clearly revealed that SCoT markers can be used to detect somaclonal variation in *Foeniculum vulgare*.

**Keywords:** *Foeniculum vulgare*, Vermivash, SCoT markers, Somaclonal variation

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### The Study of Nano Elicitors on Mucilage Production in *Linum Usitatissimum*l. Under *In vitro* Condition.

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Flax (*Linum usitatissimum* L.) is an ancient medicinal plant that cultivated for industrial and medicinal uses. Flax seed is a source of mucilage and remarkable secondary metabolites. Elicitors such as nano particles are molecules that can stimulate the production of secondary metabolites. The present study was conducted to evaluate the effects of three types of nano particles on mucilage production in *Linum usitatissimum* under tissue culture conditions. Callus induction was optimized using different explants on MS medium containing various concentrations of plant growth regulators. Concentrations of 5, 10 and 20mg/L of nano-ZnO, nano-SiO<sub>2</sub> and nano-Al<sub>2</sub>O<sub>3</sub> were selected as elicitor treatments. The results showed that type of explant and elicitor concentration affected the callus fresh weight and mucilage content significantly. Based on the results, the highest callus fresh weight and mucilage content were obtained from root explant on MS medium supplemented with 20 mg/L nano-Al<sub>2</sub>O<sub>3</sub>. Generally, the results of present study, revealed a positive effect of nano particles on callus induction and mucilage production in *Linum usitatissimum*.

**Keywords:** *Linum usitatissimum*, Nano elicitor, Explants, Mucilage

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### The Effect of Salicylic Acid on Flavonoid Production in Fennel (*Foeniculum vulgare*) under *in vitro* Conditions

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Fennel (*Foeniculum vulgare*) is an important medicinal plant in the carrot family. Secondary metabolites such as flavonoids are valuable phytochemicals, which apparently have medicinal properties. It is possible to produce secondary metabolites under *in vitro* conditions as an alternative method. The *in vitro* production of secondary metabolites influenced by different factors such as genotype, explant source and culture medium composition. The present study was conducted to investigate the effects of different concentrations of Salicylic acid on flavonoid production in Fennel. Leaf and root segments as explant were planted on MS medium supplemented with optimized concentration of plant growth regulators. Concentrations of 5, 10 and 20mg/L of salicylic acid were used as elicitor treatments. The results showed significant effects of explant and elicitor concentration on flavonoids content. These results revealed the positive effects of low concentration of salicylic acid on flavonoids content in fennel tissue culture.

**Keywords:** *Foeniculum vulgare*, Salicylic acid, Callus induction, Flavonoids

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### Comparison of Chemical Compounds of Seed, Leaf and Stem in some Populations of *Amygdalus L.* Wild Species and Hybrids in Iran

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The genus *Amygdalus L.* from (Rosaceae) family with 29 species and 6 hybrids in Iran is distributed mainly in the central, southeastern and eastern parts of Iran. The genus *Amygdalus* is mentioned in traditional medicine sources with its Arabic name “LUZ”. *Amygdalus* species are important medicinal plants in Iranian traditional medicine, where its fruit, seeds, leaves, flowers and roots are used to treat many diseases, including liver, kidney, stomach and skin disorders [3]. *Amygdalus* as well as its oil, are rich in vitamins, minerals and antioxidant properties, also they are rich in nutrients and pharmaceutical ingredients. In this study, leaves, stems and seeds of 5 populations of *Amygdalus arabica* Olivier., 3 populations of hybrid *Amygdalus\* keredjensis* Browicz. and a population of *Amygdalus lycioides* Spach., from Kouhdashteh region, between Tehran and Karaj, from the height of 1350 to 2000 meters are collected and after identification, were kept in Central Herbarium of Tehran University (TUH). The samples were dried after collection and powdered with an electric mills and then, extracted with a proper solvent. Quantitative assay of phenolic, flavonoid, flavonol, carbohydrate and protein compounds was performed by spectrophotometry and the resultant data were analyzed using Excel and SPSS software. The results showed that the amounts of these compounds were different among plant organs, so that the highest amount of phenolic, flavonoid and flavonol compounds were in leaves, stems and seeds, and the highest amount of carbohydrates were observed in leaves, seeds and stems, respectively, and the highest amount of protein compounds in seeds, stems and leaves. Finally, the maximum amount of leaves phenolic compounds in *A.lycioides* and other compounds belongs to the *A.arabica* species. Eventually it was determined that the amount of chemical compounds varies in different organs. These amounts are different among populations of species and hybrids, which indicates the impact of environmental factors. Generally, lots of *Amygdalus* species contain high potentials of medicinal plant resources and can be used for mass cultivation for medicinal purposes.

**Keywords:** *Amygdalus*, Population, Phytochemical Compounds, Medicinal Plants

**References:** [1] Attar, F; Maroofi, H.; Vafadar, M. *Nordic Journal of Botany*, 2009. 27(4): 324-327.

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### Effect of *Piriformospora Indica* Symbiotic on Plant Growth and Essential Oil Yield in *Origanum vulgare* (Lamiaceae)

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Oregano (*Origanum vulgare L.*) belongs to the Lamiaceae family is a perennial herb. *Origanum* species have been widely used in food industry for their aromatic properties, attention has been recently drawn to them due to their anti-bacterial, anti-fungal, insecticidal, nematicidal and antioxidant properties of their essential oils. Mycorrhizal fungi provide the greater absorbing surface for the transfer of nutrients to plant roots and therefore improve the plant growth. *Piriformospora indica*, a member of the newly created order Sebaciales, that colonizes many plant roots and promotes the growth. In order to study the effects of mycorrhizal like fungi (*P.indica*), on fresh and dry yield, phosphorus (P) concentration and essential oil content of Oregano, a pot experiment in the randomized complete block design with two treatments and three replications was conducted. The treatments were application of *P .indica* fungi and non-application plants (control). The highest amount of fresh herb yield ( 50 gr/pot), dry herb yield (10.5 gr/pot), essential oil content (1.1 ml/100gr dry weight), P concentration (0.4 %) and the lowest amount of fresh herb yield (25 gr/pot), dry herb yield (5.5 gr/pot), essential oil content (0.75ml/100gr dry weight) and P concentration (0.21 %) were observed in treatments of inoculation with *P.indica* and control, respectively. It could be concluded that *P.indica* fungi are able to enhance the growth and yield of Oregano through enhancing P uptake. The plant aerial parts are an important source of metabolites for medicinal application. Therefore we suggest that the use of the root endophyte fungus *P. indica* in sustainable agriculture will enhance the medicinally important chemical production.

**Keywords:** *Origanum vulgare*, Essential oil, *Piriformosporaindica*, Phosphorus concentration

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## Evaluate the Inhibitory Activity of *Thymus Vulgaris* Essential Oil on Standard Strain and Ruminant Isolated Lactobacillus

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In order to evaluate the effect of *Thymus vulgaris* essential oil on isolated Lactobacillus involve with rumen acidosis, rumen fluid sample was collected from the rumen of a cow equipped with permanent fistula. The cow according to was fed by a diet containing 65% concentrate and 35% forage. Bacterial isolation was done on standard methods. Bacterial culture was done on the special media of MRS and colonies were selected and distinguished based on their size and morphology as well as catalase, oxidase and Gram staining tests. The *Thymus vulgaris* essential oil was extracted by the Clevenger apparatus. The effect of *Thymus vulgaris* essential oils was done using the agar cup test. Thirty-six colonies of lactobacillus genus were identified according their characteristics. It was confirmed that heterofermentative Lactobacillus with a proportion of 58% were more than the homofermentative lactobacillus (42%) following running purification and biochemical tests of arginine hydrolysis and fermentation of carbohydrates and CO<sub>2</sub> production from glucose. Based on similarity biochemical and growth characteristics the 36 isolated lactobacillus were classified into 15 groups and 3 stories. All the 15 isolated groups of lactobacillus and *Lactobacillus plantarum* (standard strain) were sensitive to *Thymus vulgaris* essential oil based on the characteristics of colonies. More in vivo experiments are required for reaching to the practical application of *Thymus vulgaris* essential oil utilization against the involved lactobacillus with rumen acidosis.

**Keywords:** *Thymus vulgaris*, Lactobacillus, Essential Oil, Rumen

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## Identification Compounds from the Seeds of Milk Thistle Using the Technique of GC and Study of Anti-oxidant Activity of Various Organs of this Plant.

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*Milk thistle*, a member of the *Asteraceae* family, is a tall herb with large prickly white veined green leaves and a reddish-purple flower that ends in sharp spines. Most of documented data with *Silybum marianum* are about liver disorders; however, recently several beneficial properties on a wide variety of other disorders such as renal protection, hypolipidemic and anti-atherosclerosis activities, cardiovascular protection, prevention of insulin resistance, especially in cirrhotic patients, cancer, and alzheimer prevention. It is also used as a food remedy. The plant is exclusively used as anti-diabetic, hepatoprotective, anti-hypertensive, anti-inflammatory, anti-cancer, and as an anti-oxidant. The seeds of *Milk thistle* were collected on May 2014 from Kazerun (Fars Province, Iran) and subjected to extraction by maceration method with n-hexane. Based on the GC analysis, the results of the determination of the composition of fatty acids indicate that six saturated fatty acids and five fatty acids are unsaturated. Linoleic acid is the most important and most unsaturated fatty acid in relation to the oil of the seeds of this plant, which is equal to 44.9%. The highest saturated fatty acid content of Palmitic acid is 11.5%. Unsaturated fatty acids have a positive effect on human health and prevent the accumulation of cholesterol [3]. DPPH test was used to evaluate the anti-oxidant activity and the results were based on the IC<sub>50</sub> value. According to the results, flowers with IC<sub>50</sub>= 93.87 mg/ml have the most antioxidant properties.

**Keywords:** *Milk thistle*, *Asteraceae*, GC, Fatty acids, DPPH

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## A Consideration on *Prangos uloptera* DC. as an Important Ethnobotanical Plant of Iran.

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The family of umbelliferae includes identified aromatic, medicinal, industrial and rangeland plants. The current research studied *Prangos uloptera* DC. as an important wild plant that known to forage production, soil conservation and ethnobotanical usage in Iran. Based on ethnobotanical points this plant utilized to feed livestock and to prepare yellow natural color. In this direction, essential oils of *Pr. uloptera* obtained by hydro-distillation from the aerial parts. Then the essence was analyzed by GC and GC/MS. fifty-five compounds in the oil of the aerial parts have been identified. The main constituents of the oil were  $\beta$ -pinene (31.03%),  $\alpha$ -pinene (19.04%),  $\gamma$ -3-Carene (6.58%), Terpinolene (5.78%) and  $\beta$ -phellandrene (4.91%). The high amount of these chemical compounds shows that *Pr. uloptera* could be applied to industrial and medicinal aims.

**Keywords:** Essential oil, *Prangos uloptera* DC, Ethnobotany

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## Phytochemical Analysis and Antioxidants Activities of the *Rosa Persica* Hydroalcoholic Extract

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*Rosa Persica* (RP) is a member of the family *Rosaceae* which has several benefits in the treatment of various diseases. However, there is a lack of sufficient data on its phytochemical components and medicinal properties. In current study, the phytochemical properties of hydroalcoholic extract of the *Rosa Persica* were investigated to evaluate the medicinal and nutritional potential of this plant. The *Rosa Persica* plant were collected from Hamadan province of Iran in the late spring and identified by specialist botanists. After preparing the hydroalcoholic extract of the plant, DPPH (2,2-diphenyl-1-picryl-hydrazyl-hydrate) and total antioxidant capacity (TAC) tests as well as phenolic and flavonoid contents were determined using colorimetric methods. In the present study, the yield percentage of plant extract was calculated about 55.87%. In DPPH experiment, the average of IC<sub>50</sub> was determined for extract and vitamin C (as a control), 16.33  $\mu$ g/ml (in the range of 11.9-22.2  $\mu$ g/ml) and 8.28  $\mu$ g/ml (in the range of 6.6-10.3  $\mu$ g/ml), respectively. In addition, polyphenol, flavonoids contents and TAC in hydroalcoholic extract were measured 263.4 $\pm$ 7.2  $\mu$ g/mg, 72.3 $\pm$ 2.3  $\mu$ g/mg and 2352.6 $\pm$ 75.1  $\mu$ g/mg, respectively. Our findings provide evidence that the hydroalcoholic extract of the *Rosa Persica* is a potential source of natural antioxidants which may to be used in folkloric medicines.

**Keywords:** *Rosa persica*, Rosaceae, Medicinal plants, Antioxidant

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## Evaluation of Preliminary Phytochemicals, Determination of Mineral Elements in *Silybum Marianum* and its Biological Effects on Lowering Blood Pressure.

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*Silybum marianum*, a member of the *Asteraceae* family and is a medicinal plant that has long been used as hepatoprotective remedy. It is a tall herb with large prickly whiteveined green leaves and a reddish-purple flower that ends in sharp spines. Most of documented data with *Silybum marianum* are about liver disorders; however, recently several beneficial properties on a wide variety of other disorders such as renal protection, hypolipidemic and anti-atherosclerosis activities, cardiovascular protection, prevention of insulin resistance, especially in cirrhotic patients, cancer, and alzheimer prevention. It is also used as a food remedy. The plant is exclusively used as anti-fatty liver, anti-diabetic, hepatoprotective, anti-hypertensive, anti-inflammatory, anti-cancer, and as an anti-oxidant. Phytochemical characterization revealed the presence of carbohydrates, tannins, Coumarins, Proteins, phenols and Amino acids in both Aquatic, methanolic and Acetonic extracts of flower, seed and leaves. Three different extracts (in methanol, in acetone and in water) were prepared from the plant by maceration for further experiments. The contents of active ingredients such as phenol, flavonoid, were determined by UV-Vis spectrophotometry. It was found that the maximum amount of active ingredients were present in methanolic extract. The present study is focused to investigate mineral elements amount like K, Fe, Ca, Mn, Mg, Na, Zn and evaluate the preliminary phytochemicals in flower, seed and leaves. Atomic absorption analysis showed us that the highest level was K in flower sample (618.75 ppm) so it can be appropriate to treat high blood pressure.

**Keywords:** *Silybum marianum*, *Asteraceae*, Phytochemical, UV-Vis

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## Effects of Valerian Essential Oils on Immunity and Blood Parameters of Broiler Chickens

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An experiment was conducted to investigate the effect of valerian essential oils (*Valeriana officinalis*) on humoral immunity and blood factors of broiler chickens. This experiment was done based on a completely randomized design with 500 Arian broiler chicks, five treatments and five replicates of 20 birds per each. Dietary treatments were including control, diet containing 150 mg/kg probiotic Protexin, diet containing 150 mg/kg of antibiotics Avilamycin and diets containing 200 and 400 mg/kg of valerian essential oils. The chickens reared for 42 days. Feed and water were provided for birds *ad libitum*. At the age of 35, blood sample were collected from three birds per each replicate to evaluate humoral immune response to sheep red blood cell (SRBC) and some blood factors in serum. The antibody titer against SRBC and immunoglobulin M was surprisingly higher in control group ( $p < 0.05$ ). Cholesterol, triglycerides, HDL, LDL, calcium, phosphorus, total protein, albumin, globulin, Lipase and amylase enzymes of blood samples (sera) were not affected by different dietary treatments used in this experiment ( $p > 0.05$ ) [1,2]. So dietary supplementation of valerian essential oils could not improve humoral immunity or alter concentration of evaluated blood factors in broiler chickens.

**Keywords:** Blood factors, Broiler, Humoral Immunity, Valerian Essential Oils

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**Effects of Valerian Essential Oils on Performance and Intestinal Morphology of Broiler Chickens**

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An experiment was conducted to investigate the effect of valerian essential oils (*Valeriana officinalis*) on performance and intestinal morphology of broiler chickens. This experiment was done based on a completely randomized design with 500 Arian broilers, five treatments and five replicates of 20 birds per each. Dietary treatments were including control, diet containing 150 mg/kg probiotic Protexin, diet containing 150 mg/kg of antibiotics Avilamycin and diets containing 200 and 400 mg/kg of valerian essential oils. The chickens reared for 42 days and productive indices were measured and calculated during this period. Feed and water were provided for birds *ad libitum*. At the age of 42, two birds from each replicate were selected and slaughtered to evaluate relative weight of body components and morphological indices of intestinal tissue samples. Feed intake, feed conversion ratio, production index and livability were not affected by dietary treatments ( $p>0.05$ ). Relative weights of legs, breast, spleen, bursa of fabricus, heart and abdominal fat percentage were also not influenced by treatments ( $p>0.05$ ). The relative weight of carcass to live body weight tended to be increased in birds received 400 mg/kg valerian essential oils in comparison with other treatments ( $p=0.075$ ). Villi length of small intestine (duodenum, jejunum and ileum) was not affected by treatments ( $p>0.05$ ). So, productive indices and intestinal morphology of broiler chickens was not influenced by different dietary treatments used in this experiment [1, 2].

**Keywords:** Broiler, Performance, Intestinal Morphology, Valerian Essential Oils

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**New Polyprenylated Acylphloroglucinol Derivatives from *Hypericum scabrum*.**

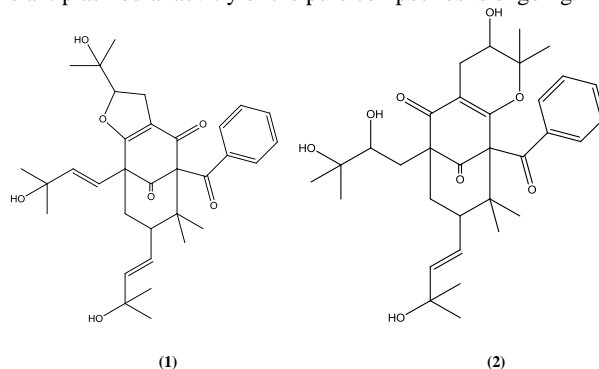
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Plants of the genus *Hypericum* (family Guttiferae), such as St. John's wort, have been widely used as folk medicines because of their broad-spectrum antibacterial, antidepressant, and neuroprotective activities.<sup>1-2</sup> A series of bioactive polycyclic polyprenylated acylphloroglucinols (PPAPs) have been obtained from the genus *Hypericum*.<sup>3</sup> Thus, PPAPs have attracted attention of researchers in both chemistry and pharmacology. In 2015, approximately 300 PPAPs had been identified, the majority being isolated from the genus *Hypericum*.<sup>4</sup> *Hypericum scabrum*, a species commonly known in Persian as "Gol-e Raei deihimi" is one of the medicinal herbs in Iran and is used in the treatment of external wound and gastric ulcer and also as sedative, antiseptic, and antispasmodic in folk medicine. As part of a systematic search for natural PPAPs with novel structure and diverse bioactivities, a phytochemical investigation on *n*-hexane extract of aerial parts of *Hypericum scabrum* was conducted. Fractionation of the *n*-hexane extract by a combination of open column chromatography on silica gel and sephadex, and semi-preparative RP-HPLC led to the isolation of two new polyprenylated acylphloroglucinol derivatives (1, 2). Their structures were elucidated by interpretation of their one-dimensional and two-dimensional NMR spectra and completed by the analysis of the HRESIMS data. Assessment of the antiplasmodial activity of the pure compounds is ongoing.



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## Reliable Identification of Trace Components of *Lamium amplexicaule* L. Essential Oil Using Curve Resolution Method-Assisted GC-MS.

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Several genera of Lamiaceae family occur in Iran and one of them is the genus *Lamium*. In Iranian botanical references such as *Flora Iranica* and *Flora of Iran*, there are 7 *Lamium* species introduced, which one of them is *L. amplexicaule* L. Different species of *Lamium* plants are using in folk medicine of Iran and the world for relieving of some gastrointestinal, respiratory, topical, inflammatory and blood disorders. Most of the biological activities of *Lamium* species are related to their major constituents, namely phenolic compounds and essential oils (EOs). Gas chromatography-mass spectrometry (GC-MS) due to high sensitivity and identifying the volatile compounds is one of the most practical methods for the analysis of Eos. In this study, the essential oil of *L. amplexicaule* L. after extraction by cleverger apparatus, was analyzed by GC-MS. Accurate identification of trace components and complete separation of overlapped peaks are difficult to achieve even if precise conditions are imposed on the chromatographic separation process. To our experience and some literatures, GC-MS combined with the chemometric resolution techniques is the best tool for the characterization of the components of essential oils. This study focuses on characterization of the components of essential oils in mentioned species using GC-MS. Advanced multivariate curve resolution (MCR) methods was used to overcome the problem of background, baseline offset and overlapping peaks and recognition of the noises from signals of trace components in GC-MS. The analysis of GC-MS data without chemometric methods revealed that twenty components exist in the *L. amplexicaule* essential oil. However, with the help of MCR this number was extended to more than thirty components with concentrations higher than 0.01%, which accounts for 92.0% of the total relative content of the *L. amplexicaule* essential oil. The most important constituents are spathulenol, caryophyllene oxide, hexahydrofarnesyl acetone, hexadecanoic acid and trans-phytol respectively.

**Keywords:** *Lamium amplexicaule*, Gas chromatography-mass spectrometry, Multivariate curve

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## The effect of various plant regulators on *in vitro* shoot induction of *Ginkgo biloba* L.

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*Ginkgo biloba* L., which often named as a living fossil, is one of the oldest species of the tree from Ginkgoaceae family that has very important medicinal and ornamental properties. The therapeutic properties of the ginkgo plant are treatment for blood disorders and memory problems, enhancement of cardiovascular function and improving eye health. Ginkgo contains high levels of flavonoids, terpenoids and antioxidants that provide protection against oxidative cell damage from harmful free radicals. In this way, antioxidants are believed to help reduce the risk of cancer. Ginkgo is resistant to a number of stresses including insects, fungi and other pests, and various environmental factors. This plant is used for landscape designing due to its high resistance to bad weather, the reduction of air pollution and long lifetimes. This plant is dioecious that usually male tree used for landscape designing because female tree produce unpleasant smelling fruit that are not suitable for landscape designs. The tree may require up to 20 years reaching maturity. Thus, mass production of Ginkgo trees and /or a source of plant material for harvesting ginkgolides are commercial interest. Hence, plant tissue culture usually applied for mass propagation of this plant. This study investigated the sterilization of explants and various plant growth regulators on maximum shoot induction. Auxiliary shoots were treated with various concentration of mercuric chloride (HgCl<sub>2</sub>) and Sodium hypochlorite (NaClO) for sterilization. Sterile explants were culture on MS media supplemented with various concentrations (0, 0.1, 0.5, 1, 1.5 and 2 mg/l) of 6-benzylamino-purine (BAP) or Kinetin (KIN) alone or in combination of 0, 0.1 and 0.5 mg/l of (Indole-3-butyric acid) IBA for shoot induction. Best treatment for sterilization was rinsing in 70% ethanol for 2 min and then sterilization with Sodium hypochlorite 2% for 20 min. The maximum shoot induction was investigated on MS medium with 2 mg/l of BA alone and 0.1 mg/l IBA and 1.5 mg/l KIN. This protocol will be successfully applied for mass micropropagation of *Ginkgo biloba*.

**Keywords:** *Ginkgo biloba* L, Shoot induction, BA; IBA, KIN



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## Biological Activities of *Euphorbia macrostegia*

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*Euphorbia* is the largest genus of the family *Euphorbiaceae* (spurges), with more than 2000 known species and is characterized by the presence of milky latex and unique flower structures. It has about 80 species in Iran one of which is called "Persian Spurge", *Euphorbia macrostegia* Boiss. that grows in the mountainous area of Iran. Various species of the genus *Euphorbia* have shown different biological activities including tumor promotion, enzyme inhibition, and cytotoxic activity. *E. macrostegia* was collected in July 2012 from the Dena mountain, Yasuj, Iran. The plant was identified by Mr. Mehdi Zare, plant taxonomist, in Medicinal and Natural Products Chemistry Research Center, Shiraz University of Medical Sciences, Iran. The roots and the shoots of *E. macrostegia* were extracted using different solvents; dichloromethane (DCM), methanol (MeOH) and MeOH: water (80:20) and the extracts were screened for their cytotoxic, antioxidant, antimicrobial properties and total phenolic contents. Cytotoxicity of the extracts was evaluated against human acute lymphoblastic leukemia (MOLT-4) cells. Among the tested extracts, the DCM extract of the roots of *E. macrostegia* with IC<sub>50</sub> values of  $7.0 \pm 1.2 \mu\text{g/mL}$ , was the most active one. The extracts were also subjected to the 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical scavenging and Folin-Ciocalteu total phenol assays. The methanol extracts of the shoots of *E. macrostegia* showed significant antioxidant activity with the highest radical scavenging potential (IC<sub>50</sub>=  $28.51 \pm 2.37 \mu\text{g}$  plant extracted to scavenge 1 mL of a  $0.5 \times 10^{-4}$  M DPPH solution), which was consistent with its highest phenolic content ( $147.12 \pm 5.46$  mg equivalent of gallic acid in 1g dry plant material: mg EG/g PM). Determination of minimum inhibitory concentrations (MICs) using the broth dilution method, confirmed that all the extracts from the plants gave various degrees of antibacterial activity against both gram negative (*Escherichia coli*: PTCC1330, *Klebsiella pneumoniae*: PTCC1053, *Pseudomonas aeruginosa*: PTCC1074, and *Salmonella typhi*: PTCC1609) and gram positive (*Staphylococcus aureus*: PTCC1112, *Staphylococcus epidermidis*: PTCC1114, and *Bacillus subtilis*: PTCC1023) test microorganisms. MeOH and 80% MeOH extracts of *E. macrostegia*, except that of 80% methanol extracts of the shoots, showed the strongest antibacterial activity against all tested microorganisms at MIC values between 1.25-5 mg/mL. Therefore, we suggest *E. macrostegia*, as a new source, to isolate its effective compounds which will be carried out by various chromatography methods and then will be identified by spectroscopy methods.

**Keywords:** *Euphorbia macrostegia*, Cytotoxic, Antimicrobial activity, Antioxidant

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## Study of Using Different Plant Meal, Defatting Procedures and Solvents to Obtain Standard Extract of Silymarin from the Seeds of Milk Thistle.

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The medicinal plant milk thistle with the scientific name of *Silybum marianum* is an annual or biennial herb native to the Mediterranean regions and is cultivated through the world. Extracts from the seeds of this plant have been used to cure liver disorders since ancient times. Featured phytochemicals of this medicinal plant are flavonolignan compounds and silybin is the most important one. The effects of applying different plant meal, defatting procedures and solvents on silymarin extraction process from the seeds of milk thistle was aimed in this study. Reflux extraction was used to obtain extracts. All extracts have been refluxed for 6 hours and the temperature was fixed at 60°C. Different plant meals including ground seeds, solvent defatted meal, cold press defatted meal, and separated pericarps have been subjected to the extraction system. Also, three different solvents including methanol, methanol 80%, and ethanol 80% were employed. Prepared extracts were weighed and then HPLC method analysis was used to quantify silymarin compounds. according to the presented data, the concentration and amount of silymarin in different extracts was compared. The extract obtained from ground seeds with methanol was able to reach the highest amount of silymarin while the highest concentration of silymarin was obtained from the extract of ground pericarp with ethanol 80%. It can be concluded when a single step extraction is intended, using ground pericarp with ethanol 80% makes sense. Otherwise, if the extract is introduced to purification phase, the extract gained from ground seeds with methanol is a better alternative.

**Keywords:** Milk thistle, Standard extract, Silymarin, Silybin

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## Blackberry Attenuates Levodopa Induced Dyskinesia in Mice Model of Parkinson Disease

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Investigation of flavonoids' effect that exists in different plants in the treatment of various diseases is a well-known issue in the world. For this purpose, the present study examined the effect of *Morus nigra* fruit juice on levodopa induced dyskinesia (LID) on MPTP-induced Parkinson in mice. In this experimental study, 42 male mice were used 7 in each: 1 control group and 5 MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine) groups. After confirmation of Parkinson in MPTP groups, a group was preserved without treatment and four other groups treated with levodopa. As soon as observing the LID, four groups receiving levodopa were divided in two other groups; a group was kept without additional treatment and three other groups were received three different doses of 5, 10 and 15 mg/kg of *Morus nigra* fruit juice. They were administered daily into three groups for 7 days. AIMS (abnormal involuntary movement scale) and cylinder behavioral test was carried out every other day. Collected data were analyzed using SPSS software with significant level less than 0.05. The results showed that *Morus nigra* fruit juice is useful in hindering LID. These effects were more pronounced on doses of 10 and 15 mg/kg that showed same results on attenuating AIMS and cylinder test. Low dose of the fruit juice doesn't seem to affect LID significantly. *Morus nigra* fruit juice is effective on levodopa induced dyskinesia in MPTP-induced Parkinson model in mice.

**Keywords:** Morus Nigra, Parkinson, Dyskinesia, Levodopa

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## The Study on Phenolic Compounds and Antioxidant Activity of *Ferulago Angulata* (Schlecht) Boiss in Different Habitats

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Different habitats affect the plant growth as well as secondary metabolites. *Ferulago angulata* is traditionally used to treat many diseases. In this study, the aerial parts of plant were harvested from five different regions in Baghmalek including North Mongar altitude 2000 (M 2000 N), M 2500 N, South Mongar altitude 2500 (M 2500 S), M 3000, North Milhe Amiri altitude 2300 (MA 2300 N), MA 2600 N, North Koh syah altitude 1800 (KS 1800 N), South Tagak altitude 2600 (T 2600 S) and North Gandomkar altitude 2600 (G 2600 N) located in Khuzestan province. The plant was dried in shade and room temperature. Extraction was done by ultrasonic and Antioxidant activity of plant was evaluated through DPPH and ORAC methods by plate reader. total phenolic compounds and flavonoid content were measured by spectrometer. *The results showed that total phenols content and antioxidant activity were different among locations.* The highest flavonoid content was found in the M 2000 N region (5.81 mg QE/g DW) and the lowest amount was registered in the MA 2600 N region (2.80 mg QE/g dry sample). Also, the highest and lowest total phenol was obtained from M 2500 S (6.49 mg GAE/g DW) and M 2000 N (3.05 mg GAE/g DW). With DPPH method, the maximum and minimum antioxidant activity were obtained in the M 2500 N and T 2600 S regions, respectively. Similarly, M 2500 N and T 2600 S populations had shown the highest and the lowest antioxidant activity in ORAC method. In summary, results suggest that the quality and quantity of chemical compounds and their antioxidant activity vary depending on the location which refers to both genetic and environmental situations.

**Keywords:** Habitats, *Ferulago angulata*, Antioxidant activity, ORAC, Flavonoid

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## Formulation and Preparation of an Anti-Acne and Anti-Smudge Crème by Using Three Essential Oils.

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In this research, formulation and preparation of an anti-acne and anti-smudge Crème from plant origin was studied. For this purpose, the aerial parts of lavender (*Lavandula officinalis*), lemon peel (*Citrus aurantifolia*) and cypress seed crotch (*Platycladus orientalis*) was used. Plant tissues of lavender and orientalis were collected from National Botanical Garden of Iran and dried in shade and their essential oils were hydro-distilled by Clevenger apparatus. Lime was prepared from market and its skin was removed from the fruit, then oil extraction was performed by hydro-distillation. The essential oils were analyzed by Gas chromatography (GC) and gas chromatography mass spectrometry (GC/MS) and their compounds were identified. Then the mixing oils with different values was used in the cream formulation. Six different formulations were prepared and the effects of them were studied for anti-smudge and anti-acne properties on 120 patients. The main constituents of essential oil of lemon peel were limonene (78.1%),  $\gamma$ -terpinene (6.2%) and myrcene (3.5%). The main constituents of lavender oil were linalool (41.7%), 1,8-cineole (19.4%), borneol (10.8%), camphor (5.5%) and p-cymen (4.8%). The main constituents of the essential oil of *Platycladus orientalis* were  $\delta$ -2-carene (39.3%), alpha-pinene (23.6%) and limonene (9.4%). The results of questionnaires completed by patients using cream showed that one of the prepared formulations (No. 4) made the most satisfaction and was selected as the best formulation.

**Keywords:** *Lavandula Officinalis*, *Citrus Aurantifolia*, *Platycladus Orientalis*, Anti-Acne Cream

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## Phytochemical Analysis of Vernalized *Humulus lupulus* Flowers

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*Humulus lupulus*, a plant belonging to the family Cannabaceae, is used as a medicinal plant with various therapeutic applications in different nations. In this study vernalized *H. lupulus* flowers were selected for further analysis on its phytochemicals. The air-dried grounded flowers of vernalized *H. lupulus* (200g) were extracted with petroleum ether (3Lx4), dichloromethane (3Lx7) and methanol (3Lx10), respectively, for a period of 24h through maceration at room temperature. Subsequently, the crude extracts were filtered, concentrated and dried at 40°C using a rotary vacuum evaporator. Further evaluation of the methanol extract was accomplished by liquid-liquid, SPE and HPLC fractionation. The fractions were analyzed via different methods of chromatography. Structure elucidation for the isolated compound was achieved with 1D (<sup>13</sup>C and <sup>1</sup>H) - NMR spectrophotometric method. The essential oil of vernalized *H. lupulus* flowers were achieved through hydrodistillation and analyzed via gas chromatography-mass spectrometry (GC-MS). Structure elucidation of the purified compound from methanol extract of *H. lupulus* based on the <sup>1</sup>H NMR and <sup>13</sup>C NMR spectrum revealed presence of a different prenylated flavonoid. In addition, analysis of the vernalized Hops essential oil resulted in the identification of 64 components, representing 87.04 % of the total essential oil that principally contained  $\beta$ -caryophyllene (25.3%),  $\beta$ -bisabolole (16.7%) and  $\beta$ -elemene (5.3%). Furthermore, the RC<sub>50</sub> value for DPPH antioxidant activity of the methanol extract was determined as 93.6  $\mu$ g/mL. The present study is the first report on the phytochemical analysis of vernalized *H. lupulus* plants which was originated from Arasbaran forest. According to our findings, numerous prenylated flavonoids such as 8-prenyl naringenin and 8-prenyl apigenin with a remarkable DPPH scavenging activity are present. Moreover, presence of high sesquiterpene hydrocarbons content followed by non-terpenoid compounds, oxygenated sesquiterpenes and finally monoterpenoids in lesser amount in the essential oil, should be noted.

**Keywords:** Cannabaceae, a prenylated flavonoid,  $\beta$ - bisabolole,  $\beta$ -caryophyllene

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## The Variation of Essential Oil Content and Composition of *Ferulago Angulata* (Schlecht) Boiss in Different Habitats of Khuzestan Province

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Chavil (*Ferulago angulate*) is a perennial medicinal plant that belongs to the Apiaceae family. The plant spreads in Turkey, Syria, Lebanon, Iraq, as well as Iran. The long-term use of plant prevents cancer and cardiovascular disease. In addition, the plant oil has high antimicrobial activity at high concentrations and is used as a food preservative, especially for dairy products. Environmental and genetic factors affect essential oil content and composition of medicinal plants. So this research was conducted to evaluate the essential oil content and composition of Chavil in different populations from five locations in east of Khuzestan province: North Mongar altitude 2000 (M 2000 N), M 2500 N, South Mongar altitude 2500 (M 2500 S), M 3000, North Milhe Amiri altitude 2300 (MA 2300 N), MA 2600 N, North Koh syah altitude 1800 (KS 1800 N), South Tagak altitude 2600 (T 2600 S) and North Gandomkar altitude 2600 (G 2600 N). Sampling was carried out on June and plant was dried on shade and ambient temperature. Essential oil was extracted by water distillation with Clevenger for 180 min. The oils were analyzed by GC and GC-MS. The results showed that oil content of populations was significantly different. The highest (1.34%) and the lowest (0.18%) essential oil contents were obtained in M 2500 S and MA 2600 N populations, respectively. Seventy nine components were identified in oil of populations which collected from different locations. There were noticeable differences in the amounts of several compounds amid nine habitats. The major of oil components were alpha pinene (20.84-49.06%), beta-E-ocimene (5.95-25.70%), trans verbenol (3.01-6.97%) and Bornyl acetate (5.15-20.63%). The highest amount of alpha pinene, beta-E-ocimene, and bornyl acetate was found in M 3000, M 2500 N and M 2500 S populations, respectively. In contrast, the lowest amount of all mentioned compounds was registered in G 2600 N. Interestingly, G 2600 N had different oil profile and compounds such as linalool, trans verbenol, bicyclogermacrene and gamma cadinene were higher than the rest of populations. Overall, the amount and components of essential oil can be influenced by ecological and regional condition of habitat as well as plant genetic.

**Keywords:** Chavil, Khuzestan, Altitude, Alpha pinene, Beta-E-ocimene, Bornyl acetate

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## Effects of Organic Amendments and Biofertilizer on Fenugreek Emergence and Chlorophyll Content.

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Fenugreek (*Trigonella foenum-graecum* L.) is one of the most important medicinal plants worldwide which it is primarily of interest for its seeds. Fenugreek shoots are used as a vegetable in fresh as well as dried form in Iran. A greenhouse experiment was conducted at Shiraz University to investigate the effect of organic amendments, biofertilizer and N fertilizer on emergence characteristics, chlorophyll content and N status of fenugreek. The experimental design was a completely randomized with three replicates. Treatments consisted of sheep manure, composted municipal waste, azotobacter as biofertilizer and N fertilizer. A control field soil without any fertilizer was also included. Results showed that all fertilizer treatments increased fenugreek emergence compared to control (30 %). However, sheep manure was superior to the others (85 %). Plants N status was ranked as N fertilizer (4 %), sheep manure (3.8 %), municipal waste compost (3 %), azotobacter (2.5 %) and control (1.4 %). Nitrogen fertilizer caused an increased chlorophyll content in plants (57, SPAD meter reading) following with sheep manure (51, SPAD meter readings). The lowest chlorophyll content was gained in control treatment (27, SPAD meter reading). Nitrogen fertilizer and sheep manure produced greater plant biomass than the other fertilizer treatments.

**Keywords:** Medicinal plant, Organic farming, Sheep manure, Azetobacter

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## Antioxidant and Antimicrobial Effects of Different Craps, the most Widely Used in Zanjan Areas, Iran.

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Zante currant and raisin are well known species which widely applied in Zanjan areas. As food and medicine of various drugs. The aim of this study was to investigate antibacterial and antioxidant capacity of aqueous extract of Zante currant and raisin. The Hot Water Extraction (HWE) method was used in this experimental study. Minimal inhibitory concentrations (MIC) and minimal bacteriocidal Concentration (MBC) of aqueous extract of Zante currant and raisin were determined by macrodilution method with using different concentrations of the extracts (1.5-16 mg/ml), in addition, the antioxidant activity was determined by total phenol and reducing power assay. The aqueous extract of Zante currant and raisin were rich in phenols. In this regard Zante currant extract showed a phenol content and reducing power ability, ( $1.87 \pm 0.39$  mg GAE/g DW and  $IC_{50} = 0.05 \pm 0.004$  mg /g DW, respectively) more than raisin aqueous extract ( $0.6 \pm 0.06$  mg GAE/g DW and  $IC_{50}$  g DW respectively) ( $p < 0.001$ ). Based on these results, it is clearly indicated that aqueous extracts of *M. spicata* and *M. pulegium* have noticeable in vitro antioxidant ability against various oxidative systems; moreover these extracts can be used as an accessible source of natural antibacterial, against bacterial pathogens especially food poisoning pathogens such as *S. aureus* and *E. coli*.

**Keywords:** Zante currant, Raisin, Antimicrobial activity, Antioxidant ability

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## Biocontrol Capability of Medical Plants Cacoti and Fennel Essential Oil on Fungi Growth of *Botrytis cinerea* Pers. (Grape Mildew).

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*Botrytis cinerea* Pers. (Grape Milde wagent) is the one of common and fast growing fungus of plants. It harms juicy fruits especially grape during growth and after harvesting, that has a wide range of host; the importance of using alternative control strategies to reduce the use of fungicides is more than ever, noticing using chemical fungicides residues and environmental contamination, on the other hand, the development of resistance in the pathogenic population. In this study, biocontrol activity of the essential oil of medical plants Cacoti (*Ziziphora cliniopodiode* lam.) & Fennel (*Foeniculum vulgare* Mill.) will evaluate in vitro against fungi growth. Fennel is a perennial herb, which is seen in both, wiled and crops in Iran; generally, all parts of it have therapeutic properties. Cacoti is one of the most potent herbs, in the mint grass. Essential oils distilled with water using a cloning machine. Then tested in 6 concentrations of 0, 50, 100, 200, 400, 800  $\mu\text{l l}^{-1}$  in three replications on the fungus by mixing with PDA medium. After treatment of essentials, samples were placed in under controlled condition at 24 °c, 60% moisture & 10% light during a week, diameters of fungal growth hole were noted every 24 hours and the growth of fungi was calculated. The experimental results showed that essential oil of fennel concentration of 800 is the maximum inhibition with 90% and the minimum inhibitory with concentration of 50 to 25.85%, while concentrations of 50 and 100 Cacoti, was more prevented compared to fennel essential oil in similar rates. In addition, the 200, 400 and, 800 Fennels essential oil is stronger inhibitor ratio than Cacoti. According to results of this research, it is Suggestible to use Fennel essences with a 100% fungal growth inhibitory effect as a substitute for synthetic chemicals to reduce the growth of *Botrytis cinerea* Pers.

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## Quantitative Determination of Iridoid Glycosides, and Phenylpropanoid Glycosides in *Verbena officinalis* by HPLC-DAD.

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Vervain the aerial parts of *verbena officinalis* (Verbenaceae) has been used for many disorders. It is a bitter and has been used for digestive disorders. It also has sedative properties and has been used for anxiety disorders and as a tonic during convalescence from chronic illness. According to European Pharmacopoeia in dried aerial parts of vervain having a minimum of 1.5 per cent of verbenalin is considered to be standard for use as an herbal drug. Vervain dried extract was investigated for the content of verbenalin, and acteoside by HPLC–DAD analysis instrumentation. Accordingly, the amount of verbenalin, and acteoside were calculated and reported as 0.93 and 0.29 (% w/w).

**Keywords:** *Verbena officinalis*, Verbenalin, Acteoside, HPLC-DAD

**References:** [1] *Martindale, The Complete Drug Reference*, 38 edition, Vol. 3, page 2645.

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## Quantitative Determination of L-Citrulline in *Citrullus lanatus* by HPLC-DAD.

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In plants, L-citrulline is present at high levels in some Cucurbitaceae, especially the watermelon (*Citrullus lanatus*), and certain algae, such as *Grateloupia vulgaris*. The main role of Citrulline that is a non-essential amino acid is the transportation of nitrogen. Citrulline and citrulline malate are used as dietary supplements. Determination of citrulline in water melon extract was performed by liquid chromatography after pre-column derivatization procedure with 2, 4-Dinitrofluorobenzene (DNFB). Citrulline contains not less than 98.0% and not more than 102.0% of L-citrulline calculated on the dried basis. L-Citrulline and water melon dried extract from two foreign suppliers were analyzed accordingly and reported as 96.5% and 0.35% (w/w) respectively.

**Keywords:** *Citrullus lanatus*, L-citrulline, pre-column derivatization, 2, 4-Dinitrofluorobenzene

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## The Effect of Mixed Formulation of Mycotoxin Adsorbent, Including a Mineral Substance and Herbal Active Ingredients in Adsorption of Mycotoxins Contaminating Animal and Poultry Feed.

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Mycotoxins are secondary metabolites produced by fungi and cause mycotoxicosis. Mycotoxins are considered as a potential risk to human and animal health. One of the useful and effective strategies for improving the quality of food and keeping it from mycotoxins contamination is toxin binders. The purpose of this study was to evaluate the effect of mixed formulation of a mycotoxin adsorbent, including a mineral substance and herbal active ingredients in adsorption of feed contaminated by mycotoxins. A predetermined amount of each of the mycotoxins was added to the diet based on a simplified procedure derived from the protocol published by Kolosova 2012 (Kolosova & Stroka, 2012). The mixture became completely homogeneous. After two days, mycotoxin adsorbent, including a mineral substance plus *Mentha piperita* and *Zataria multiflora* essential oil, was added to the diets at 0.08 %. After 3 days maintaining feed mixture at 25 °C, mycotoxin levels measured by HPLC and percent of reduction of mycotoxins in comparison to the control feed was calculated. The amount of mycotoxins decreased after treatment with the adsorbent at range between 59.6% and 71.3%. *Fusarium* toxins were also significantly reduced by adsorbent. The ratio of reduction from highest to lowest was as the following, aflatoxin B1, fumonisin B1, Zeralon and Ochratoxin. Considering the economic and health significance of mycotoxins and also the results obtained in this study, it is suggested that the herbal active ingredients whose beneficial effects were scientifically proven, can be also used in toxin adsorbent formulations to further improve the effects of mineral parts of adsorbent and to add antifungal and immunostimulant effects.

**Keywords:** Mycotoxin, Herbal active ingredients

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**Comparison of Some of the Biochemical Parameters of Leaf and Root of *Plantago major* L. and *Plantago lanceolata* L. During vegetative Stage in Sistan Region.**

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Iran has variable climate and because of its climate and geological situation, it is one of the best areas for growing medicinal plants. Medicinal plants need different kind of ecology also the variability of climate. *Plantago lanceolata* L. and *Plantago major* L. are two valuable species of the genus *Plantago* in Iran and they are naturally automotive. In this research, the amount of photosynthetic pigments and also the amount of leaf proline as well as the concentration of carbohydrates in the leaf and roots of two species of *Plantago lanceolata* and *Plantago major* were studied during the vegetative stage in Sistan. In this study, the amount of photosynthetic pigments was measured by Lichtenthaler method, Proline by Bates method and carbohydrates was measured in the modified Shlegl method. In the *Plantago major*, chlorophyll a is equal to 10.71, Chlorophyll b 11.78, total chlorophyll 22.49, carotenoid 5.45 and proline 0.315 mg/g fresh leaf weight and also the amount of carbohydrates in the leaf is 60.86 and in the root is 407.22 µg/ml, in the *Plantago lanceolata*, the chlorophyll a was 6.75, Chlorophyll b 6.71, total chlorophyll 13.46, carotenoids 6.65 and proline 0.295 mg per gram of fresh leaf and also, the amount of carbohydrates in the leaf is 109.5 and at the root of 501.31 µg/ml, Was calculated using the corresponding formulas. The ratio of chlorophyll a/b in the *Plantago major* was 1.01 and in the *Plantago lanceolata* was 0.91. The amount of each photosynthetic pigment, also proline in the *Plantago major*, were higher than that of the *Plantago lanceolata* but carbohydrates was on the contrary less. The chlorophyll a/b ratio was very low in both species. In the vegetative stage, the levels of chlorophyll a, b and carotenoids would be significantly reduced. But the amount of proline and carbohydrates increases because accumulate these two activates the osmotic mechanism, and subsequently the conditions will be provided to absorb more of the water and salts from the environment by the root.

**Keywords:** *Plantago*, Chlorophyll, Carotenoid, Proline

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**Determination of Total Triterpenoids Derivatives in *Centella asiatica*'s Herb and Extract by HPLC-DAD.**

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The *Centella asiatica* (*Centella*) or Indian pennywort in herbal medicine contains madecassic acid, asiatic acid, and asiaticoside. It is used as a mild diuretic, antirheumatic, dermatological agent, and peripheral vasodilator. It has been used topically in the management of indolent wounds, leprosy ulcers, and cicatrization after surgery. In *Centella asiatica* dried aerial parts, and in powdered form the percentages of different triterpene derivatives known as madecassoside, asiaticoside, madecassic acid asiatic acid were added to contain 1.94, and 1.60 (% w/w) respectively as asiaticoside on the dried basis. Accordingly, *Centella asiatica* reduced to a powder is supposed to have not less than 2.0% of triterpene derivatives, and not less than 6.0% of total triterpenoid derivatives, expressed as asiaticoside, calculated with reference to dried drug. The Powdered *Centella asiatica* Extract was prepared from *Centella asiatica* by extraction with different mixture of ethanol and water. The highest amount of triterpene derivatives as asiaticoside in the extract with ethanol 70 % calculated to be 12.54 (% w/w). On the other hand, in powdered *Centella asiatica* Extract, taken with alcohol, methanol, acetone, or a mixture of these solvents the labeled amount of total triterpene derivatives is expected to be not less than 40%, calculated on the dried basis.

**Keywords:** *Centella asiatica*, Asiaticoside, Total Triterpenoids derivatives

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## Molecular Determination of Sex in *Cannabis sativa* L. by ISSR and SCAR Markers (MADC5, MAD6).

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*Cannabis sativa* L. is an important plant with various uses in pharmaceutical and paper production industries. Due to the higher priority of female and male cannabis plants for pharmaceutical uses and fibre industry, respectively, and quality reduction of the pharmaceutical products by pollination and fertilization, early determination of sex in cannabis is one of the major concern of researchers and producers. Seeds from 26 accessions from different regions of Iran along to one accession from Afghanistan were planted in the field based on the Randomized Complete Block Design. Five female and five male plants were sampled from each accession for molecular analyses. Thirteen ISSR and two SCAR primers were used. The highest and the lowest mean of heterozygosity were found in ISSR3 and the lowest in UBC825 primers. Respectively overall, 143 polymorphic loci and one polymorphic locus were obtained in ISSR and SCAR primers, respectively. Out of 143 polymorphic ISSR loci, only 10 markers had significant relations with gender. The SCAR primer of MAD6 showed polymorphism for gender while the MAD5 could not determine male and female individuals.

**Keyword:** Sex determination, Female, Male, Cannabis, Molecular marker

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## Impact of Calcium Nitrate and Potassium Nitrate Foliar Application on Postharvest Quality of Seedless Barberry (*Berberis vulgaris* L.) Fruit.

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Seedless barberry (*Berberis vulgaris* L.) is one of the most popular medicinal small fruit in Iran. Foliar spraying is an applied method for crop feeding which micro and macronutrients in form of liquid are used. Potassium is known, not only improve fruits yield and quality but also in water use efficiency, it is easily absorbed and distributed through leaf tissues and plays an important role in the growth of fruits. Calcium is also considered as one of the most important minerals determining the quality of fruit since it is required for cell elongation and cell division. Many physiological disorders of fruits are associated with low Ca levels. Increasing the fruit calcium content leads to an increase in fruit firmness and delays fruit ripening or prevents calcium-related disorders. Sufficient nitrogen is necessary for tree growth, leaf growth, flower formation and optimal fruit formation, and combining all of these results in a good product and high yield. Application of supplemental Ca decreased the Na content in plant parts and increased the K content. This study was designed to determine the influence of foliar application of calcium nitrate ( $\text{Ca}(\text{NO}_3)_2$ ) and potassium nitrate ( $\text{KNO}_3$ ) at a concentration of 0.5% on quantitative and qualitative traits in seedless barberry. Foliar application of  $\text{Ca}(\text{NO}_3)_2$  and  $\text{KNO}_3$  at concentration of 0.5% was carried out during four stages (22 May, 1 July, 11 August and 11 September) during spring and summer in 2017. The experiment was based on randomized complete block design with four replications. The results of the analysis of the elements showed that application of  $\text{Ca}(\text{NO}_3)_2$  and  $\text{KNO}_3$  significantly affected N uptake by barberry fruit. Also Ca content of the fruit tissues increased by application of  $\text{Ca}(\text{NO}_3)_2$  compared with the control. In addition, foliar application of  $\text{Ca}(\text{NO}_3)_2$  significantly increased K content in seedless barberry fruits compared other treatments. Foliar application of  $\text{Ca}(\text{NO}_3)_2$  and  $\text{KNO}_3$  had no significant effect on phosphorus content of fruit. Interestingly, foliar application of Ca improved postharvest quality and extends shelf life as well as reduced fruit decay during refrigerated storage compared to the control, however, the fruit color was to some extent brighter than control.

**Keywords:** Calcium Nitrate, Fruit analysis, Potassium Nitrate, Shelf life

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**Comparison between Essential Oil of Lavender from Iran and Delberg Germany.**

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Lavender (*Lavandula anagustifolia*) is plant that flowering season of lasts from first to end August. Lavender oil has benefits such as reduce anxiety and emotional stress, improve brain function, relieve pain, and improve sleep. This study describes the chemical composition by using gas chromatography of two essential oil of lavender from Iran and Delberg Germany. Compounds such as limonene, 1,8 cineol, linalool,  $\alpha$ -terpineol, borneol and camphor in aerial part of essential oil of Iranian lavender essential oil were 2.64, 21.74, 31.7, 1.36, 10.15 and 6.13 w/w%, respectively. while the amount of limonene, 1,8 cineol, linalool,  $\alpha$ -terpineol, borneol and camphor in essential oil of Delberg Germany were 12.3, 35.8, 9.4, 0.3, 0.2 and 33.7 w/w%, respectively.

**Keywords:** Lavender, Essential oil, Chemical composition, Gas chromatography

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**Influence of Gibberlic Acid and Boric Acid Foliar Application on Physicochemical Properties and Quality of Pomegranate Fruit (*Punica granatum L.*)**

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The present study designed to evaluate the effects of foliar application of gibberlic acid and boric acid on quality of pomegranate fruit Shishe-kab cultivar during 2017 growing season at Research Orchard of Birjand University. The experiment conducted in a randomized complete block design with eight replications. Treatments were included control (spray with distilled water), boric acid (200 and 600 mg l<sup>-1</sup>) and gibberlic acid (50 and 150 mg l<sup>-1</sup>). Foliar spray applied three times with one month interval, late in May, June and July. The results showed that the lowest ascorbic acid was observed in boric acid 200 mg l<sup>-1</sup> (0.2) followed by gibberlic acid 150 (0.24) compared to the control. There were significant differences in ascorbic acid among treatments. The highest total chlorophyll was recorded to be highest in boric acid 200 mg l<sup>-1</sup> (27.7) and boric acid 600 mg l<sup>-1</sup> (11.1) was the lowest. The highest total weight of the arils was observed with the application of boric acid 200 mg l<sup>-1</sup>. The result showed that foliar application of acid boric and gibberlic acid had positive effects on quality and quantity properties of pomegranate fruits that are in agreement with findings of Digrase et al. [1] and Sing et al.

**Keywords:** Ascorbic acid, Boron, GA<sub>3</sub>, Quantity properties, Shishe-kab cultivar

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**Comparison of the Volatile Constituents Obtained by Several Extraction Methods from Aerial parts of *Salvia leriifolia* Benth.**

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In this study, microwave-assisted hydrodistillation (MAHD) and microwave assisted head-space solid-phase microextraction (MA-HS-SPME) has been compared with a conventional method, hydrodistillation (HD) for the extraction of volatile constituents from aerial parts of *salvia leriifolia* Benth. The essential oil extracted by MAHD for 40 min were quantitatively and qualitatively similar to those obtained by conventional hydrodistillation for 3.5 h. In the MA-HS-SPME technique, isolation, extraction and concentration of volatile components were carried out in one single step and the analytes on the SPME fiber were analyzed by GC-MS. Some parameters, including SPME fiber coating, microwave power and irradiation time were optimized.  $\delta$ -Cadinene, muurolol,  $\beta$ -pinene and 1,8-cineol were identified as major constituents of this plant in all methods. It has been shown the extraction of volatile compounds with MA-HS-SPME was better in terms of energy saving, extraction time and plant material.

**Keywords:** *Salvia leriifolia*, Microwave, Head space solid-phase microextraction

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**Molecular Diversity in Iranian *Cannabis* accessions**

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*Cannabis* (*Cannabis sativa* L.) is an important medicinal and industrial plant. Which grows in different areas of Iran and some other countries. However, there is just little information about of Iranian cannabis accessions. This study was performed to assess variation of cannabis accessions collected from different parts of Iran along to one accession from Afghanistan. For a detailed evaluation of diversity among accessions, 10 SSR primers were used. The analysis of molecular variances showed 30 and 70% variation between and within accessions, respectively. The low amount of Fst mean (0.178), confirmed the low variation among accessions. The maximum number of alleles belonged to C08-CANN2 (six alleles). Also the maximum Shannon information index (0.99) was observed in this primer. The highest observed heterozygosity belonged to B01-CANN1 and D02-CANN1 (0.98). The maximum Shannon information index was observed in Esfahan that showed the highest variation within this accession. Generally, the results showed a great genetic variation in the studied accessions that those may be applied by plant breeders as a rich germplasm for making selection of desirable genotypes.

**Keywords:** Cannabis breeding, Medicinal plant, Shannon index, SSR

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**The Quantitative and Qualitative Analysis of Essential Oils Obtained from of *Satureja Bachtiarica* Bunge using Different Extraction Techniques by GC-MS Method.**

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In this paper, two different methods: hydrodistillation (HD), microwave-assisted hydrodistillation (MAHD) accompanied with gas chromatography-mass spectrometry (GC/MS) have been applied for extraction of volatile organic compounds of *Satureja bachtiarica* Bunge from Iran. Different experimental parameters such as extraction time, and temperature were optimized. The extraction time using the MAHD is no more than 30 minute using a microwave power of 300 W. Carvacrol was as major component by three methods of HD (64.31%) and MAHD (55.04%) respectively. The essential oil obtained with MAHD method contained substantially higher amounts of oxygenated compounds and lower amounts of monoterpenes than conventional method.

**Keywords:** *Satureja bachtiarica* Bunge, Hydrodistillation, Microwave Hydrodistillation

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**Karyotypic Study of some *Thymus* Species from Iran.**

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Thyme (*Thymus* spp.), a member of the Lamiaceae family, is a perennial and very important medicinal plant. The genus of *Thymus* has many species in Iran that some are endemic. Interspecific crosses among the species of *Thymus* have made many difficulties to identify the species from each other. Knowing of the chromosomes number and morphology is the first step in differentiation of *Thymus* species. To study karyotypic attributes in some *Thymus* spp., seeds of four species, *T. lancifolius*, *T. daenensis*, *T. vulgaris*, and *T. kotschyanus*, were planted to obtain root tips. Mitotic chromosomes were studied in meristematic cells of the root tips obtained from germinated seeds. The basic chromosome number was X=15 in all of the species, but their ploidy levels varied. Karyotypic formula of *T. lancifolius* was 15m+1sm as diploid (2n=30), 30m and tetraploid (2n=60) in *T. daenensis*, 29m+1sm (2n=60) and tetraploid in *T. kotschyanus*, and 15m, and diploid (2n=30) in *T. vulgaris*. Based on intra-asymmetry chromosome index, to determine evolutionary level of the karyotypes, the most asymmetric and symmetric karyotypes belonged to *T. vulgaris* and *T. lancifolius*, respectively. One way analysis of variance showed a significant difference (P<0.01) among the species for all of the quantitative attributes of the karyotypes. Cluster analysis classified the species into two distinct groups. The species of *daenensis* and *kotschyanus* were placed in a distinct cluster and the other species including *lancifolius* and *vulgaris* allocated to the same group.

**Keywords:** *Thymus* spp, Cytogenetic, Medicinal plant, Karyology

**References:** [1] Stebbins, GL:1971. *E. Arnold. London*. Pp 216.

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## Study of Growth Characteristics and Yield of Saffron (*Crocus sativus* L.) by Different Levels Amino Acids.

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Amino acids organic fertilizer improve the microorganisms in the soil, which their activity facilitates the absorption of some nutrients and, consequently, increases the growth and improves the yield of the plant (Cao et al., 2010). In order to investigate the effects of different of amino acids levels on growth characteristics and yield of saffron, an experiment was conducted as randomized complete block design with three replications, University of Birjand during growing season of 2016. Treatments were 3 levels of amino acid (0, 2 and 4 L.ha<sup>-1</sup>). Traits including: yield of fresh flower, number flowers, average of weight flower and dry stigma. Results showed that the highest yield of fresh flower (14.66 gm<sup>-2</sup>), number flowers (4.13 gm<sup>-2</sup>), average of weight fresh flower (0.340 g), dry stigma (0.013 g) were obtained in plants treated with 4 L.ha<sup>-1</sup> of amino acids, while the lowest values were recorded in the control. but, not significance difference between treatments 2 and 4 L.ha<sup>-1</sup>. These results are in agreement with other reports that confirm the positive effects of amino acids on the plant growth of different species. Afifipour and Khosh-Khui (2015) reported that applying amino acids improved all growth and flowering characteristics of tuberosa cultivars. the results showed that amino acids had strong impacts on growth characteristics and yield of saffron.

**Keywords:** Amino acid, Saffron, Stigma, Yield

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## Evaluation of Anticancer Effect of Saffron in Native Dogs with Liver Metastasis in Tehran Province.

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Saffron is a perennial, stemless herb belonging to *Iridaceae* family. It is cultivated in various countries such as Iran, Greece, Spain, China and Turkey. 20 mg Saffron tablets are safe to use in human and animals on applied studies. Cancer, an important health problem, is a major cause of mortality around the world. Anti-cancer effect of Saffron in hepatic metastasis have been investigated in human but not in dogs, so we aimed to evaluation this effect in dogs. For this reason, 12 mixed breed dogs from both sexes that had hepatic metastasis were randomly divided in to two 6 number groups. In group I (control), after confirmation their liver problem by taking MRI from their liver, they have been received drug as chemotherapy, alone. Second group (test), have been received 20 mg Saffron tablet/daily in addition to the chemotherapy for a month. After 30 treatment day, test group were health, totally but 4 dog of the control group were been health. In result, Saffron can be used to as anticancer herbal drug in treatment of hepatic metastasis in dogs as humans for its crocin substance as a safe drug. It must apply more studies about this result in other dogs, too.

**Keywords:** Saffron, Anticancer, Hepatic metastasis, Dog

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## The Comparison Between *Trachyspermum Ammi*, Thyme and Cotrimoxazole in the Treatment of Diarrhea Caused by *E. coli* in Rabbits.

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Rabbit-origin enteropathogenic *E. coli* (EPEC) causes substantial diarrhea-associated morbidity and has zoonotic potential. We decided to investigate the therapeutic effects of *C. copticum* as one of the medicinal plants of Tehran with thyme as herbal medicine and cotrimoxazole as *E. coli* antimicrobial agent in the treatment of rabbits with gastrointestinal infection after clinical examination and culture of the shed, *E. coli* were isolated, too. We can find *Trachyspermum ammi* in Iran, in Sistan-Baluchistan, Azerbaijan, Isfahan, Khuzestan, Fars, Kerman and Khorasan. Thyme is pretty in all of parts of Iran, too. 15 number of two month pet rabbits with diarrhea in Tehran were randomly selected that was referred to us as pet clinic and then detected and confirmed the presence of *E. coli* bacteria digestive problems due to high load randomly divided into 3 groups. The first group twice daily for 1 week once every 12 hours of liquid extracts (tinctures) *C. copticum* (Because of the bitter taste of this plant) 3 ml each time orally. The second group received twice daily orally every 12 hours, two drops of thyme oil were fed to a control group and the third group was also, every 12 hours 30 mg tablets were fed cotrimoxazole. After a week of prescribing these drugs results were as follows: *C. copticum* and thyme recipient groups like the group receiving oral antibiotic tablets of cotrimoxazole as your digestive quite recovered his health and appetite also returned to normal. At the end of the three groups of gastric fluid culture results were negative for *E. coli*. Because of the many advantages of traditional medicine and herbs and its low disadvantages compared to chemical drugs and these drugs are easily accessible in nature, especially plants *C. copticum* in Tehran specially on rabbits and also, these drugs lower price than similar chemical it's better to replace these drugs with recent like chemical drugs by Pharmaceutical companies after more Supplementary researches. It should be noted that the active ingredient in disinfectants against *E. coli* both in Thyme and *C. copticum* is thymol and carvacrol. It must be noted that we earlier found the same findings in using these herbal drugs on dogs in Khuzestan province, too.

**Keywords:** *Trachyspermum ammi*, Thyme, Cotrimoxazol, *E.coli*, Rabbit

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## Effect of $\gamma$ -Irradiation on the Phenolic Content and Antioxidant Activity of Moldavian Balm *Dracocephalum moldavica* L.

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The use of  $\gamma$ -radiation dates back to many years ago, and is accredited for application in different foods with several purposes. Also, it has been increasingly used in many countries for the treatment of aromatic plants. Genus *Dracocephalum* is an important member of the Lamiaceae family. Moldavian balm (*Dracocephalum moldavica* L.) is an annual, herbaceous, balm-scented and spicy aromatic species of the Genus. Previous phytochemical investigations of *Dracocephalum* species have reported the presence of various secondary metabolites, like terpenoids, flavonoids, alkaloids, lignans, phenols, coumarins, and cyanogenic glucosides. *D. moldavica* is a plant commonly used in pharmaceutical and cosmetic industries representing a natural source of several functional compounds. The aim of this study was to evaluate the effects of gamma radiation on *D. moldavica* phenolic content and antioxidant activity. Total phenolic content of the plant was measured using Folin–Ciocalteu assay and the results were expressed as mg gallic acid equivalents per gram of dry weight of extracts. Also radical scavenging activity of the plant was estimated by DPPH method. In this experiment, four doses of gamma radiation (0, 10, 15 and 20 Gy) were applied to seeds of the plant. The data were analyzed by SPSS 16.0 software and by Duncan test. According to the obtained results, the plants which were treated by 15 and 20 Gy showed significantly ( $p < 0.05$ ) highest amounts of phenolic content with the values of 345.10 and 327.23 mg GAEs/g extract, respectively. Concerning DPPH radical scavenging activities of the samples, the plants treated with 15 Gy exhibited high potential, with 61.5 % inhibition. There was no significant difference in the effect of radiation dose on the radical scavenging efficiency of the plant.

**Keywords:**  $\gamma$ -irradiation, Phenolic content, Antioxidant, *Dracocephalum moldavica*

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## Determination of Hematological Effects of Hydroalcoholic Extract of Baneh (*Pistacia Atlantica*) Fruit in Normal Wistar Male Rats.

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Baneh (*Pistacia atlantica*) is a subspecies of pistachio and native medicinal plant of Iran. Due to its diverse properties, Baneh has been applied in traditional medicine. The present experimental study was designed to evaluate the effects of the hydroalcoholic extract of Baneh on the hematological parameters of rats. Eighteen male Wistar rats weighing 170-240 gr were divided into 3 six-member groups. Groups 1 to 3 were treated with 200 mg/kg bw of the extract, 400 mg/kg bw of the extract and distilled water (control group) for 30 days, respectively. Blood samples were then taken from the heart of the rats and hematological parameters were measured. The obtained data were analyzed using SPSS software version 21, one-way ANOVA and Tukey tests. Administration of different concentrations of the hydroalcoholic extract significantly increased the number of red blood cells (RBC), white blood cells (WBC), hemoglobin (Hb) concentration, as well as the average volume of red blood cells (MCV) compared with the control group. However, it has no effect on the other blood parameters ( $P < 0.05$ ). Baneh extract can increase the strength of membrane, lifetime and cell population of RBCs. The observed increase in the number of RBC and Hb concentration can be a result of increasing hematopoiesis process. In addition, increase of the WBC after treatment with Baneh extract can enhance the body resistance against pathogenic agents.

**Keywords:** Baneh, Hydroalcoholic extract, Traditional medicine, Hematological parameters

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## Experimental Investigation of Extraction of Active Ingredients of *Scrophularia striata* Boiss (as a Medicinal Herb) via Supercritical Fluid Extraction Method with Ultrasonic Waves

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One of the major problems faced by modern societies are various infectious diseases with different roots, most of which are supposed to be treated using chemical antibiotics. Considering side effects of these drugs and the fact that those fail to realize any positive influence in many cases, an ever increasing deal of attention has been paid to the utilization of medicinal herbs which exhibit great therapeutic properties without any side effect. This important characteristic of the medicinal herbs doubles the significance of the method used to extract active ingredients from the herbs in such a way to end up with optimal efficiency. In the present research, extraction of extract from *Scrophularia striata* Boiss, as a medicinal herb which is rich in active ingredients with antibacterial and anti-depression effects (isorhamnetin-3-o-rutinoside, quercetine, cinnamic acid, nepitrin), using supercritical CO<sub>2</sub> (SC-CO<sub>2</sub>) with the help of ultrasonic waves, and also applying the same method without the use of the ultrasonic waves were investigated. Due to its low volatility, the medicinal extract in this plant is difficult to collect and extract. In the present research, it was observed that the yield of active ingredient extraction using the presented method was about 68% higher when ultrasonication was further applied, as compared to the case where no ultrasonic wave was applied. Thermodynamic conditions used in the present research included the pressure values of 150, 180, and 210 bar, and temperatures of 45, 55, and 65°C, with the ultrasonication device operated at frequencies of 37 and 80 kHz and power of 50 and 100 W. The results indicated that, when the pressure and temperature were set to 180 bar and 65°C, respectively, while USCF system was operated at 37 kHz, an output efficiency of 87% (in mass) was obtained, while the efficiency was as low as 41% under the same set of conditions but without ultrasonication.

**Keywords:** Extraction, Ultrasound, Supercritical fluid, *Scrophularia striata* Boiss plant





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**Experimental Study on Effect of Hydroalcoholic Extract of Khinjuk (*Pistacia Khinjuk*) Fruit on Some Hematological Parameters in Wistar Male Rats**

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*Pistacia khinjuk* is one of the pistachio species and native medicinal plant of Iran. This plant has shown many pharmacological activities, including anti-diabetic, anti-tumor, anticholinergic, antimicrobial, anti-inflammatory, anti-ulcerative, antioxidant, antiviral, anti-asthmatic and antifungal activity. The present experimental study was designed to evaluate the effects of the hydroalcoholic extract of khinjuk on the hematological parameters of rats. Eighteen male Wistar rats weighing 170-240 gr were divided into 3 six-member groups. Groups 1 to 3 were treated with 200 mg/kg bw of the extract, 400 mg/kg bw of the extract and distilled water (control group) for 30 days, respectively. Blood samples were then taken from the heart of the rats and hematological parameters were measured. The obtained data were analyzed using SPSS software version 21, one-way ANOVA and Tukey tests. To assess the significance of the difference in mean blood parameters between different groups, T test was performed at a significant level of  $P < 0.05$ . The results of this study indicated that the mean number of red blood cells (RBC) and hemoglobin concentration (Hb) were significantly between the control and group 1 (recipient of Kenjuk with a concentration of 200 mg/kg bw) ( $P < 0.05$ ). The mean number of RBCs, white blood cells (WBC) and Hb were statistically significant between the control and the group 2 (recipient of Kenjuk with a concentration of 400 mg/kg bw) ( $P < 0.05$ ). However, it has no effect on the other blood parameters ( $P < 0.05$ ). Also, the difference between neutrophil percent ( $P = 0.002$ ) and lymphocyte percentage ( $P = 0.012$ ) was statistically significant. The results of this study showed the effect of Kenjuk extract on increasing the number of RBC, Hb and WBC count in rats. The observed increase in the number of RBC and Hb concentration can be a result of increasing hematopoiesis process. In addition, increase of the WBC after treatment with Baneh extract can enhance the body resistance against pathogenic agents.

**Key words:** *Pistacia Kinjuk*, Hydroalcoholic extract, Rat, Hematological parameters

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**Evaluation of Genetic Variation of Seedling Emergence in Basil *Ocimum basilicum* L.**

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Basil (*Ocimum basilicum* L.) is an annual medicinal plant of Lamiaceae family. Basil is a very important medicinal plant as the large amounts of essential oils in the vegetative organs and the wide diversity of the secondary compounds in the essential oil. Early stages of plant development is very critical and seed lots that have the more ability to germinate, will have a successful plant establishment and eventually will have a good density high crop yield. In this regard, the aim of this study was to identify the best basil accessions at the emergence stage. This experiment was conducted as a completely randomized design in 2017. Twenty basil accessions were planted under control condition in the greenhouse and seedling emergence were recorded daily. In this study Speed and percentage of seed emergence, mean emergence time (MET), and emergence energy (GE), the average of trait, genetic and phenotypic variations, coefficient of genetic and phenotypic variations, and Broad sense heritability for the evaluated traits were calculated. Results indicated that the highest percentage of emergence was observed in Isfahan 2 accessions. Regarding the traits of emergence, Shiraz accession had the lowest time to emergence. The highest emergence energy was related to the Shiraz accession and the lowest amount of emergence energy was the Switzerland accession. The results showed that Isfahan2 and Shiraz under control condition had better seedling emergence and establishment than the other accessions. In current study, genotypic and phenotypic variances, genotypic and phenotypic variation coefficients and Broad sense heritability were estimated for the traits. It should be noted that further studies on essential oil content and yield of these accessions should be studied in future studies in order to make a better selection.

**Keywords:** Broad sense heritability, Emergence rate, Establishment, Genetic variation

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## Assessment of Trigonelline Content in some Ecotypes of *T.foenum-graecum* L. and *T.eliptica* By HPLC Method

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Trigonelline, as a bioactive marked alkaloid, is a hormone found naturally in plant products and is a vitamin B6 derivative. The present study was taken to analyze genetic diversity in respect to evaluation and fluctuation of trigonelline content between two species of genus *Trigonella* L. comprised of *T.foenum-graecum* (L.) and *T.eliptica* accompany with their five and four ecotypes for each one respectively. Hence the seeds of mentioned species, and their ecotypes were collected from different cultivation areas of Iran. By utilization of HPLC method, the quantitation of trigonelline was carried out on a Phenomenex luna column C18 (250×4.6 mm, 5μ particle size), mobile phase composition were SLS (pH adjusted to 3 with HCl): acetonitrile (50.0:50.0 v/v) which were delivered at a flow rate of 1.0 ml per min and also the detection wavelength was at λ=265 nm. Whereas injection volume was 10.0 μl, the column temperature was maintained at ambient temperature too. Also, Empower 1154 chromatographic software was used for data acquisition. The result showed significant variation in alkaloid TG ingredient among different two species and their ecotypes. Most of ecotypes were rich in trigonelline and it's recorded value was higher than standard pharmaceutical levels. Seeds ecotypes of *T. foenum-graecum* presented a higher level of trigonelline in comparison with those species. According to our statistical analysis of quantitative data, Ge4, *T.foenum-graecum* (L.), local selected clone from Azarbayjan-e Gharbi-Makoo contained the highest amount of trigonelline (104.26) and the lowest one (29.97) belonged to *T.eliptica*, Ge8, which was cultured in Lorestan- Azna. In addition, the highest amount of trigonelline obtained between *T.eliptica* ecotypes, was belonged to Ge9, that was cultivated in Yazd- Nodoshan. No special and significant relationship was observed between the region of cultivation and alkaloid (trigonelline) content in seeds. Based on the result of this experiment, it could be concluded that the alkaloid content can be influence by genotypic characteristic rather than environmental factors, however totally the resultant interaction between genotype and ecological factors impresses the content of alkaloid as a secondary metabolite.

**Keywords:** *Trigonella foenum-graecum*, *T.eliptica*, Trigonelline, HPLC

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## Evaluation of Different Levels of Humic Acid on Yield and Some Physiological Parameters of *Silybum marianum* L.

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*Silybum marianum* L. is one of the importance medicind plants in commerce that has many application in drug and sanitary industries and it has a chemical composition that is variable from in bioactive substances. In this research, the effects of humic acid on growth, and some physiological parameters (photosynthetic pigmentation) ,accumulation of compatibility metabolites (proline and carbohydrates) of *Silybum marianum* L. were studied in Zahedan region. The treatments includes humic acid applicationat four leaf stage and in four levels: zero (control), one, two and three Kg ha-. Determination of total chlorophyll content from the Arnon method and proline extraction and measurement was determined from Bates method. The highest leaf growth length (350 mm) and the highestr root fresh weight (4.7 g) were obtained from two Kilo grams per hectare and the most dry leaf weight (365 g) and the highest root dry weight (175. g) of 3 kg Grams per hectare humic acid was obtained. The highest chlorophyll a in leaf (10.33 mg / g green leaves) and the highest chlorophyll b in leaves (2.35 mg / g green leaf) and the lowest content of proline in leaves and the highest carbohydrate was obtained in two Kg per hectare of humic acid. The Statistical results showed significant of humic acid on growth physiological parameters.

**Keywords:** Humic acid, Physiological Parameters, *Silybum marianum*

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## Effects of Different Algae Extract Levels on Antioxidant Activities, Anthocyanin and Phenol of Saffron (*Crocus sativus L.*)

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In order to investigate the effects of different of algae extract levels on antioxidant activite, anthocyanin and phenol of saffron, an experiment was conducted as randomized complete block design with three replications at the Agricultural Research Station, university of Birjand during growing season of 2016. Treatments were 3 levels algae extract (0, 15 and 30 L.ha<sup>-1</sup>). Traits including: antioxidant activities, anthocyanin and phenol. Results showed that the highest antioxidant (29.80 %), anthocyanin (24/49 %) and phenol (61.85 %) were obtained in plants treated with 30 L.ha<sup>-1</sup> of algae extract, while the lowest values were recorded in the control. but, not significance difference between treatments 15 and 30 L.ha<sup>-1</sup>. Therefore application of bio-fertilizers and reducing fertilizer use is an important step towards achieving the principles of sustainable agriculture and reduction of environmental pollution and improvement of saffron quality characteristics.

**Keywords:** Algae extract, Antioxidant, Medicinal plants

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## Survey on Possiablityof Infestation of *Heterodera crucifrae*, Franklin, 1945 to Medicinal Plant.

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Plants are damaged by differentkinds of plant pathogens around the world every year, whichplant parasitic nematodsamong these factors. They cause crop lossesin direct and indirect ways. The most destructive plant parasitic nematodes called endoparasites. *Heterodera crucifrae*, Franklin, 1945 is a endoparasites nematodethat has been reported from different regions of the world as well as Iran. Medicinal plants are now considered as economic plantsdue to their biochemical properties and they widely used in the pharmaceutical industry even in low amount but in useful quantities.In this study, considering that the main hosts of cabbage nematodes (white cabbage and kohlrabi) have infection by the nematode in the field conditions of the distribution areas, the possibility of contamination of some medicinal plants by nematode was carried out.For this purpose, after the preparation of the infested soils by nematodes from the vegetable growing fields in Tabriz,the extraction of nematodes (cysts) was performed using Fenwick (1940) method, and the cysts were isolated from soil by needle and stereomicroscope. Disinfection of the cysts was carried out by pouring them in 0.6% sodium hypochlorite (Naocl) solution for 30 seconds. For infection assays, autoclavationof soil was performed and in greenhouse condition planting of done.For each seed, four or five sterilizedcysts were placed inside thepots adjacent to the seeds.After germination and at different stage from germination to flowering the plants checked for nematode penetration. For this roots of plants stained usinglactoglycerin- foschen acid solution.It has been reported that black (*Brassica alba L.*) and yellow mustard (*Brassica juncea L.*) are as host forthe nematode. Our new detections showed that *Descurainia sophia* and *Alyssum homolo carpum* are also cabbage cyst nematodes hosts.

**Keywords:** Cabbage, Greenhouse, City Cabbage Nematode

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## Quality and Quantity Control of Herbal Medicine Products Derived of *Chamomile*.

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Chamomile (*Matricaria chamomilla* L.) is one of the most ancient medicinal herbs. The dried flowers of chamomile contain many terpenoids and flavonoids contributing to its medicinal properties. Chamomile preparations are commonly used for many human diseases such as hay fever, inflammation, muscle spasms, menstrual disorders, insomnia, ulcers, wounds, gastrointestinal disorders, rheumatic pain and hemorrhoids. In this study, pharmaceutical herbal products containing extract or essential oil of chamomile (in the form of drops, syrups, ointments, and creams) were purchased from pharmacies in the province of Tehran. Microbial, physical and chemical control tests were carried out based on the standards and information obtained from the British, United States and Iranian herbal pharmacopeias in order to ensure the high quality of the products. The physical properties of the product for soluble forms (syrup and drops) were evaluated such as transparency, color, odor, taste, pH and stability assessment. The semi-solids products (ointments and creams) were evaluated for the stability of bulk products, centrifuge test, uniformity, resistance against heat and cold, freezing and melting test and moisture content (for the cream). In addition to physical test, the amounts of active ingredients of all products were evaluated. For this purpose Dispersive liquid-liquid extraction was used for extraction of chamazulene before gas chromatography-mass spectrometry analysis. Although in some products that were standardized based on the apigenin and total flavonoids, the amount of apigenin and total flavonoids measured by high performance liquid chromatography and spectrometry method, respectively. The obtained results showed that some products didn't have enough quality and some of them were confirmed.

**Keywords:** *Matricaria chamomilla*, Quality control, Herbal product

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## Effect of Plant Growth Regulators and Species Type on the Cauchy Growth Rate of the Medicinal Plant.

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Woad, a scientific name of *Isatis tinctoria* L., is a perennial herb which has recently been given special attention in traditional medicine. Because the extract of leaves and its powder in epilepsy, liver cramps, dyspnea, pertussis, palpitations, and metabolic extracts of the entire organ, prevent the growth of HIV virus. In order to investigate the effect of plant growth regulators and extracts on callus induction and regeneration of glass fiber of medicinal plant, the present study was carried out in a factorial experiment based on a completely randomized design with several replications at the Agricultural Research Center of Gorgan in 1395. The test factors included various concentrations of cytokinin hormone (TDZ), Kinetin (KIN), 6-benzylaminopyrin (BAP) at concentrations of 0, 1 and 2 mg / L alone or in combination with different concentrations of auxin including indole Butyric acid (IBA), naphthalenic acetic acid (NAA) or indolebuteric acid (IBA) at concentrations of 0, 0.1, 0.5 and 1 mg / L per spraying percentage in callus in culture media The basis of Moorishig and Scoog (MS) was studied. The results of analysis of variance of data showed that there is a significant difference between the hormonal combinations of BAP + NAA at 1% probability level on microorganisms, hormonal compositions and their interaction. As in the results of the comparison of the mean of data, leaf microfract (45.23%) than petiole (17.85%) did more spontaneous breeding in the same callusing environment. The highest amount of shoots (74.99%) was found in the leaves and leaves of 2BAP + 0 / 1NAA hormone composition (Fig. 1). Increasing the NAA hormone concentration from zero to 0.1 mg / L in these hormonal compositions increases the shoots in both of the two specimens, but in the petiole peptide in compounds containing 2 mg / L, it prevents shoots. In the combination of 2BAP + 0 / 1NAA in this experiment, in addition to further shoots, its production shoots had longer than other hormonal compounds. In a study that was conducted to indirectly regenerate the hematopoietic thymus from the finite specimen, it was found that the NAA hormone in combination with the BAP hormone inhibits shoots (Chofie *et al.*, 2000).

**Keywords:** Woad, NAA, BAP, Medicinal Plant



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## The Effect of Methyl Jasmonate and Jasmonic Acid on some Physiological and Biochemical Traits of *Matricaria chamomilla*

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*Matricaria chamomilla* is one of the most important medicinal plants that has been one of the best-selling medicinal plants in the world in recent years. Jasmonates, as a new family of phytohormones, play an important role in regulating plant growth and development and are considered as one of the most effective non-living elicitors. In this study, in order to investigate the changes of dry and wet weights, chlorophyll a and b, total chlorophyll, carotenoids, leaf soluble protein and superoxide dismutase and peroxidase enzymes, *Matricaria chamomilla* plants that grown at the eighth week stage were sprayed by different concentrations of Methyl jasmonate (0, 50, 100 and 150  $\mu\text{M}$ ) and leaf samples were prepared 48 hours after spraying and Jasmonic acid (0, 50, 100 and 150  $\mu\text{M}$ ) in different growth stages (6, 8, 10 week), after treatment by Jasmonic acid, leaf samples were prepared at two times (48 hours after spraying and at the end of vegetative growth period). Except for superoxide dismutase enzyme which has the highest increase in 100  $\mu\text{M}$  Methyl jasmonate, the remaining traits showed the highest increase at 150  $\mu\text{M}$  Methyl jasmonate. Based on the results, spraying with 150  $\mu\text{M}$  of Methyl jasmonate on German chamomile in the eighth week growth stage, increased some physiological and biochemical traits and could be a positive stimulus in increasing the amount of photosynthetic pigments and secondary metabolites in this medicinal plant. Wet and dry weights was increased at tenth week with 100  $\mu\text{M}$  Jasmonic acid, but chlorophyll a and b, total chlorophyll, leaf soluble protein and carotenoids showed the highest increase at 48 hours after treatment with 100  $\mu\text{M}$  Jasmonic acid in the sixth week. In the samples taken at the end of vegetative growth, these traits have higher content in the eighth week. Based on the results of this study, 100  $\mu\text{M}$  Jasmonic acid can increase dry and wet weights of plant, chlorophyll (a, b and a+b), leaf soluble protein and carotenoids after 48 hours and also at the end of vegetative growth period. Increasing of these traits can help the better plant growth and ultimately help produce more secondary metabolites.

**Keywords:** *Matricaria chamomilla*, Methyl jasmonate, Jasmonic acid, Chlorophyll

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## Amount of Some Phytochemical Compounds in Dodder (*Cuscuta campestris*) Is Determined by Its Host Plant.

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Dodder (*Cuscuta* spp.) a parasitic plant which feeds entirely on its host, has various therapeutic properties including hepatoprotective, neuroprotective, anti-inflammatory, and anti-mutagenic activities. Dodder can parasite on stem of wide range of annual, biennial and perennial plants. The main aim of present research was to investigate on possible role of the host plants in determination of dodders' phytochemicals content. Aerial parts of *C. campestris* growing on the two distinctive hosts i.e. christ's-thorn (*Ziziphus spina-christi* L.) and fennel (*Foeniculum vulgare* Mill.) were collected at research farm of Jahrom University in June, 2016. Metanolic extract of coarsely powdered dodder from both hosts was exploited for phytochemical analysis. Results showed that christ's-thorn-hosted dodder had significantly much more amount of total phenolic compound and tannins while had less amount of flavone and flavonoids than that of fennel-hosted dodder. It has been reported that metabolite profiles of *C. japonica* changed dramatically after attachment to the host plant. However, in the present research there were no significant differences between the two dodders in terms of antioxidant activity as well as total carbohydrate and flavonoids contents. It can be concluded that amount of at least some phytochemical compounds in dodder depends mainly on metabolites of its host plant. Therefore, host plant may in part determine the therapeutic properties of dodder. Hence, if dodder is collected from an appropriate host in nature, its therapeutic properties would probably become more pronounced.

**Keywords:** Antioxidant activity, Metanolic extract, Parasitic plant, Phenolic compounds

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**Investigation the Changes of Some Physiological and Biochemical Traits of *Matricaria chamomilla* under Salicylic Acid Treatment.**

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Salicylic acid is a natural phenolic compound in many plants, which is considered as a strong phytohormone due to its different roles in plant metabolism. Salicylic acid can be used as an abiotic elicitor for stimulating the production of secondary metabolites in medicinal plants such as *Matricaria chamomilla*. In the present study, *Matricaria chamomilla* leaves were treated in different growth stages (6, 8 and 10 weeks) with different Salicylic acid concentrations (0, 100, 150 and 250  $\mu\text{m}$ ). Sampling was performed 48 hours after spraying, and dry and wet weights, chlorophyll a and b, total chlorophyll, carotenoids and soluble protein, as well as activity of peroxidase and superoxide dismutase enzymes were evaluated. The highest increase in all physiological traits (except wet and dry weight of leaves) was observed at sixth week of growth and in 250  $\mu\text{m}$  Salicylic acid. At the indicated concentration, the highest wet and dry weight increase was observed at the tenth week. Also, superoxide dismutase and peroxidase enzymes had the largest increase in treatment with a concentration of 250  $\mu\text{m}$  Salicylic acid. According to the results of this study, the spraying of *Matricaria chamomilla* with 250  $\mu\text{m}$  Salicylic acid increases some physiological traits and ultimately further growth of the plant.

**Key words:** Salicylic acid, Chamomile, Superoxide, Soluble protein

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**Effect of Inorganic and Biological Nitrogen Fertilizers on some Phytochemicals and Essential Oil Constituents of Peppermint *Mentha piperita* L.**

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Nitrogen is one of the most important macronutrient which is vital for achieving maximum plant growth. However, widespread applications of chemical nitrogen fertilizers especially for growing the vegetables are threatening human health. The main objective of present research was to evaluate response of peppermint phytochemicals and essential oil constituents to urea, as a prevalent inorganic source of nitrogen, and Nitroxin, as a biological fertilizer containing free living nitrogen fixing bacteria including *Azotobacter* and *Azospirillum* genera [1]. A RCBD experiment with three replications was carried out in research farm of Jahrom University, Jahrom, Iran through March to July, 2016. Treatments were urea, Nitroxin, combination of both fertilizers, and control. Parts of peppermint rhizomes were inoculated with Nitroxin prior to cultivation, and the corresponding plots were also fertigated by Nitroxin at 50 days after planting (DAP). Urea (60 kg/ha) was applied to the corresponding plots at both planting and 50 DAP. Results showed that Nitroxin treatment increased essential oil yield and total carbohydrates in comparison to urea treatment. Also, there were no significant differences between the two treatments in terms of total phenolics, flavonoids, chlorophyll (a+b), carotenoids, antioxidant activity, menthol, menthone, 1,8-cineol and limonene. Therefore, it seems that nitrogen fixing bacteria of Nitroxin could perfectly supply the nitrogen element demanded by peppermint plants. It has been reported that the combination of *Azotobacter* inoculation with chemical fertilizer gave the highest total oil yield per plant in peppermint [2]. Since plant growth promoting rhizobacteria (PGPRs) had not adverse effects of chemical fertilizers on environment and human health, therefore Nitroxin can be considered as an excellent alternative for urea especially in organic production of peppermint.

**Keywords:** Azotobacter, Biofertilizer, Organic farming, Urea

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## Effect of Different Waterlogging Regimes on Growth and Aloin Yield of *Aloe vera*.

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*Aloe vera*, a succulent perennial and drought resisting medicinal plant in the world, is well known for its therapeutic potential. A number of beneficial effects of *A. vera* have been reported, including immunomodulatory, wound and burn healing, hypoglycemic, anticancer, gastro-protective, antifungal and anti-inflammatory properties. These beneficial therapeutic properties of *A. vera* have been employed for a number of commercial applications. Soil flooding is a seasonal factor that negatively affects plant performance and crop yields. In order to investigate the effects of waterlogging regimes on growth and aloin yield of *A. vera*, a pot experiment was conducted, and the waterlogging set to four regimes (0, 7, 14 and 21 days) and the waterlogging depth was 5cm. The waterlogging regimes had a significant effect on leaf weight, aloin production and root growth. The data indicate that the waterlogging treatments a reduced the leaf fresh and dry weight, 35% reduction in fresh weight and a 43% reduction in dry weight occurred 21 days after waterlogging treatments compared to the control. The result showed that the waterlogging decreased the fresh and dry weight of root. The fresh and dry weight of root subjected to waterlogging regimes decreased by 62 and 41.2% compared to the control. Additionally, waterlogging decreased the aloin yield of the lowest aloin yield (5 g per plant) was observed 21 days after imposing the waterlogging, there was no significant different between 7 and 14 day after waterlogging treatments. Therefore, when waterlogging adversities occur in *A.vera*, the implementation of appropriate surface and subsurface drainage schemes is needed as soon as possible to alleviate the damage.

**Keywords:** *A. vera*, Aloin, Flooding stress, Medicinal plants

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## Effect of Different Treatments on Improvement of Germination of Seeds of *Agrimonia eupatoria* L. (Rosaceae).

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*Agrimonia eupatoria* L. (Rosaceae) is a herbaceous plant that spreads in the northern and central regions of Iran. The phytochemical studies of the different parts of the plant revealed the presence of phenolic compounds, tannins, terpenoids, carbohydrates and vitamins. Experimental analysis have demonstrated this medicinally plant is well known with its beneficial effects in various diseases such as liver complaints, diarrhea, edemas, eye infections and kidney diseases. It exerted antibacterial, antioxidant, gastrointestinal and many other pharmacological effects. The plant grows in lowlands and margins of forests, on moderate humid and dry soils. The stem grows out of seeds in the first year and in the second year it will enter the reproductive phase. Seeds encircled with a thick whorl of hooked prickles. According to researches, seed dormancy and changes in environmental factors such as drought and cold stresses affect the seed germination rate and can delay germination for 4 to 6 weeks. In this research, the effect of different treatments includes: different media (MS-1/2MS), Change the photoperiod, scarification seeds, wetting and temperature treatments were evaluated on break dormancy of this plant seeds and germination percentage were evaluated. Results indicated that changing the culture medium does not have a significant effect on seed germination and in both conditions the germination percentage is approximately the same. The application of absolute darkness after seeding on the medium increased the 50% germination rate. Applying cold and wet treatments on seeds for a period of 30 days at 1 to 4 °C increased 40% germination. The highest germination percentage among the treatments was related to the scarification and mechanical removal of seed cover, which caused 90% germination of seed germination.

**Keywords:** *Agrimonia eupatoria*, Rosaceae, Germination, Seed dormancy

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## Expression of Superoxide Dismutase Mrna in Testes of Ram by Pomegranate by-Products Consumption.

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Superoxide dismutase (SOD) is one of the main antioxidant enzymes against oxidative stress in testis which catalyzes the dismutation of the superoxide anion into hydrogen peroxide. Pomegranate has antioxidant properties and free radicals scavenging, due to presence of chemical and bioactive compounds in various parts of fruit, including peel and seed. The most important compound are polyphenol and fatty acids in peel and seed, respectively. Although previous studies have demonstrated that pomegranate and its by-product reduced oxidative stress in testicular tissue, limited information exists on effects of pomegranate on antioxidant genes expression in reproductive organs. The present study was undertaken to find out the relationship between the transcriptional alternation of SOD2 and pomegranate consumption in ram's testis. Twenty-one Iranian rams were randomly divided into three groups (n=7) and fed experimental diets for 80 days: control diet (C), diet containing 31% pomegranate seeds (S), and diet containing 27% pomegranate peels (P). All rams were offered isoenergetic and isonitrogenous rations. Testicular tissue samples were taken and quantified by real-time RT PCR for mRNA abundance of SOD2. SOD2 mRNA level in peel group was significantly higher than control (p<0.05); whereas SOD2 expression were unaltered by Pomegranate seed. In conclusion superoxide dismutase is more influenced by pomegranate peel than seed which warrants further studies.

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## Findings of Fractional Shortening Echocardiography Effects of Alcoholic Extract of Berberis Vulgaris Fruit with Different Doses on Isoproterenol Induced Experimental Myocardial Infarction In Rat.

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In traditional medicine, there are many uses for Berberis fruit. In this study, the use of Berberis fruit was determined and its effect on Fractional shortening of rats was determined. 25 non-pregnant female rats weighing 50 ± 300 g were purchased. The animals were randomly divided into five groups of five. All of the mice in the group received isoproterenol (85 mg / kg) for two consecutive days for subcutaneous injection of an experimental myocardial infarction. The first group was selected as the control group. In the second group, the extract of Berberis fruit was administered 150 mg / kg body weight per day for 2 weeks orally administered. The third group of the extract of Berberis fruit was dosed in 300 and the fourth group with 600 mg / kg body weight for two weeks was orally administered. The fifth group was healthy rats, only 2 ml of distilled water was orally administered. In all rats, on 1, 7 and 14 days, standard echocardiography was performed and a Fractional shortening was determined. To perform echocardiography, two-dimensional ultrasonographic operation of the luminance mode was initiated in a physically bound intergranular area, and in the standard view, by taking the appropriate images, using the motion vector locator, this pattern was set at the selected location and, after fixing the appropriate images Measurement was performed using measuring instruments and a Fractional shortening was calculated. The present study revealed that the extract of Berberis fruit has a decreasing effect on the Fractional shortening cardiac of the studied mice, and also with increasing the dose and the time elapsed this shortened reduction is exacerbated.

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## Concurrent Determination of Glycyrrhizic Acid and Glabridin in Different Licorice (*Glycyrrhiza glabra L.*) Populations of Iran.

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*Glycyrrhiza glabra L.* is generally recognized as licorice for their sweet taste belongs to Leguminosae family and distributed in Spain, Italy, Turkey, Caucasus, Iran, Central Asia and the western part of China. The plant contains numerous phytochemicals including triterpene saponins, flavonoids, polysaccharides, pectins, simple sugars, amino acids, mineral salts and various other substances. Interesting pharmacological and nutraceutical properties have led to increasing demand for licorice in food and pharmaceutical industries. Development of new genetically uniform genotypes with high yield and high content of desired active substances and durability is necessary. As a basis for licorice breeding, information on phytochemical characters of available germplasm should be provided. The present study have been conducted to characterize the variation of phytochemical composition of licorice germplasm collections from different parts of Iran. For this purpose, rhizome of the plants were collected from 21 different areas and dried in ambient temperature. Well- grinded rhizomes were used for extraction by ethanol (70 %) and glycyrrizic acid and glabridin content were evaluated by HPLC using C<sub>18</sub> column with acetonitrile-water containing 0.3% H<sub>3</sub>PO<sub>4</sub> as mobile phase. The range of glycyrrizic acid varied from 2.7 mg/g (Taft population) to 83.8 mg/g of dry weight (Bajgah population). The maximum content of glabridin was observed in Kashmar population (19.6 mg/g of dry weight). The obtained information can be applied in cultivation and domestication process of the plant.

**Keywords:** *Glycyrrhiza glabra L.*, Phytochemical diversity, Glabridin, Glycyrrizic acid

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## Administration of Extraction of *Salvia officinalis* Leaves Decreases Impairment Effect of the Elevated Platform Stress in Adult Mice.

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Several studies have shown that leaves of *Salvia officinalis* have a wide range of biological effects, including memory formation. On the other hands, there are numerous reports that stress impairs memory retrieval in different models of memory. In the present study we assessed the possible improvement effect of extraction of *Salvia officinalis* leaves on stress-induced impairment memory retrieval. Male adult mice (25-30 gr) were used in this study. The length of the experiments period, for all groups of animal, was 9day. The animals were received drinking water or several doses of extraction of *Salvia officinalis* leaves (5, 10, 20 mg/kg) as oral gavage for 7 days. In the 8<sup>th</sup> day the animal were trained by step-through apparatus and they tested in 9<sup>th</sup> day. Elevated plat-form stress (15 minute) was induced 30 minute before testing. Step-through latency (STL) to enter dark, chamber step-through apparatus, were recorded as measures of passive avoidance memory retrieval. Results indicated that pre-test induction of stress, impaired the memory retrieval. Seven days feeding by extraction of *Salvia officinalis* leaves (10, 20 mg/kg) improved stress-induced impairment memory retrieval in stressed animals. On the basis of these experiments, it seems that oral administration of extraction of the *Salvia officinalis* leaves prevents impairment effect of stress on memory retrieval in the passive avoidance task.

**Keywords:** *Salvia officinalis*, Step-through, Passive avoidance memory, Stress

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## Effect of Fennel Essential Oil (*Foeniculum vulgare*) and/or Flaxseed Oil on Insulin Resistance, Ovarian and Pancreatic Morphology in Polycystic Rat.

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The aim of present study was to investigate the potential of fennel essential oil and/or flaxseed oil on insulin resistance caused by PCOS in Wistar female rats. Total of 30 adult female rats (5-6 month age and  $267 \pm 20$  g of BW) were allocated to 5 treatments and 6 replicates each in a completely randomized design. The experimental groups were: 1-CON, rats fed ordinary diet, 2- PCOS, polycystic rats fed ordinary diet, 3- PCOS+Fe+Fl, rats fed ordinary diet + fennel essential oil+flaxseed oil, 4- PCOS+Fe, rats fed ordinary diet + fennel essential oil, and 5- PCOS+Fl, rats fed ordinary diet+flaxseed oil. Polycystic induction was done by I.M. injection a single dose of estradiol (4 mg estradiol valerate/rat). Fennel essential oil (100 mg/kg BW/day) and flaxseed oil (429 mg/kg BW/day) were orally gavaged in a 50 d period. Results showed that quantity of cystic follicles in PCOS rats decreased ( $P < 0.05$ ) after feeding flaxseed oil and/or fennel essential oil comparing to the PCOS group. Flaxseed oil decreased ( $P < 0.05$ ) fasting blood glucose testosterone and HOMA-IR index, but increased ( $P < 0.05$ ) progesterone and insulin concentration, QUIKI and HOMA- $\beta$  indices. Feeding flaxseed oil and fennel essential oil increased blood glucose level and HOMA-IR index ( $p < 0.05$ ), but decreased HOMA- $\beta$  and QUIKI indices. Pathologically, No sign of lesion and damage was found in rats liver fed flaxseed oil and (or) fennel essential oil. Although number of Langerhans islets decreased under PCOS condition, but consumption flaxseed oil and/or fennel essential oil improved this condition. It was concluded that feeding flaxseed oil had better effect on improvement of insulin sensitivity in rats suffered by polycystic ovary syndrome.

**Keywords:** Poly cystic ovary syndrome, Insulin resistance, Flaxseed oil, Fennel essential oil

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## A Comparative Study between the Use of Alcea and Thyme with Terbutaline in the Treatment of Asthma Cats.

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Asthma attacks are dangerous for cats and in some cases due to the severity of illness and death due to respiratory problems will be cats. Beta-agonists Terbutaline is a bronchodilator as chemicals used in the form of sprays used in cats. Because it is a chronic disease that has no cure and the only way is to use spray and steam bath cats to open the airways and prevent choking the animal. Because some cats are allergic to the spray, we decided to plant *Alcea angulata* is domestic in Iran and thyme for the treatment of asthma in cat. A total of 12 domestic cats with asthma were randomly selected and were divided into three groups of four. In the first group 2 times a day for 5 days every 2 puffs of terbutaline spray was used. In the second and third groups respectively 5 minutes twice a day, every time the animals are exposed to smell of thyme and *A. angulata*, 2 drops of oil plants from its flower that is effective on asthma treatment, were sprayed in the air. Overall, the improved breathing in two patients treated with vegetable oil spray Thyme and *Alcea* with the improvement of respiratory problems due to the use of terbutaline as chemical drug were matched in the form of spray. In addition to being sprayed with vegetable oils affect the nervous cats resulting in improved mood and calm these animals that they are inherently playful and rather cranky. *Alcea* herb mucilage compounds that is effective on asthma because it is antitussive. Thyme also has plant compounds such as thymol and carvacrol to a greater extent and saponins, flavonoids and tannins to a lesser extent. Most work in traditional medicine to treat diseases of the respiratory tract, it can strengthen the lungs, cough and mucus is good, that is a solvent that helps in the excretion of mucus in the lungs. Accordingly, for the treatment of cough, upper and lower respiratory tract inflammation and asthma also can be used. So, Thyme and *Alcea* flower oils can be produced individually or in combination in spray form, commercially. In addition, both of them are also easily accessible in nature of Iran and the world.

**Keywords:** *Alcea*, thyme, Terbutaline, Asthma, Cat

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## Biodeterioration Control of Books and Documents in Cultural Heritage Organization and Archives of Iran Using of Atmospheric Cold Plasma.

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Fungi are among the most degradative micro-organisms which deteriorate paper-based items of cultural heritage. Appropriate conservation treatments to deal with fungal infections include: mechanical, chemical, and biological methods, which can cause some undesirable effects on the paper itself and health hazards for humans. Using different radiations are among those methods which are using for controlling cellulolytic fungi. The aim of this study is to control *Aspergillus* and *Penicillium* species causing biodeterioration on some books in national library of Iran. For testing antifungal effect of the plasma, 250 µl spores were poured in petri dish. The treatment was carried out using 1.2 Watt of plasma and four replications were made for each treatment. The result showed that, the radiation energy of plasma had the full control efficiency on *Penicillium* but, it couldn't prevent and control *Aspergillus* growth as well as it did for *Penicillium* [1].

**Keywords:** Biodeterioration, Cultural Heritage Organization, *Aspergillus*, *Penicillium*

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## Isolation and Identification the Structure of *Prangos acaulis*'s Root.

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*Prangos acaulis* (Apiaceae) is a small perennial herb growing wild in North, N.East, West and central parts of Iran. In the Iranian traditional medicine, this plant is used as laxative, diuretic, pain killer, emollient, carminative, antifungal, antioxidant, antibacterial, anti-helminthic and so on. Phytochemical analysis of *P. acaulis* roots and evaluation of their cytotoxicity were the final goal of the present study. To pursue this aim, the air dried root of the plant powdered and extracted by petroleum ether, DCM and methanol using a Soxhlet apparatus at the boiling points of the solvents. The methanolic extract was loaded on Sep-pak cartridge and fractions were eluted by methanol-water mixtures (20%, 40%, 60%, 80% and 100%). The petroleum ether extract fractionated by VLC method on silica gel using step gradient of Hexane-ethyl acetate mixtures (2%, 4%, 6%, 8%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90% and 100%) as elution system. The fractions were monitored on TLC and similar ones mixed together. The major constituents of fractions were separated by preparative TLC or HPLC and their structure were elucidated by <sup>1</sup>H, <sup>13</sup>C-NMR spectroscopy. The spectroscopic data suggested Suberosin (7-methoxy 6-prenyl coumarine), 6 isoprenyl 7-o-apios coumarine, (2'isoprenyl [2"-o-glucoside]) 6,7 fluorane 4 methoxy coumarine and (6 isoprenyl [2',3' di-o- glucoside]) 7 methoxy coumarine structures for the isolated compounds. The cytotoxic effect of extracts were studied by MTT assay on A549 cell line (epithelial cell of lung). According to our findings, the effect of dichloro methane extract was more potent than the others and was also dose-dependent and time-dependent.

**Keyword:** *Prangos acaulis*, Jashir pakutah, MTT assay, TLC, cytotoxic activities

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**Effect of Priming with Gibberellin on the Germination of Medicinal Pumpkin (*Cucurbita pepo*) under Cadmium Chloride Stress.**

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In order to investigate the effect of priming with gibberellin on the germination of medicinal pumpkin (*Cucurbita pepo*) in the presence of cadmium (Cd) as a heavy metal a factorial experiment was conducted based on completely randomized design with three replications. Treatments were different concentrations of gibberellin (0, 25 and 50 mg lit<sup>-1</sup>) and cadmium chloride (0, 100 and 200 mg lit<sup>-1</sup>). Results showed that germination percentage and rate increased in the presence of Cd in comparison with control and the highest germination percentage (88%) observed by applying 200 mg lit<sup>-1</sup> of Cd, but other germination traits like seedling growth and vigour index decreased by Cd. Increasing the gibberellin concentration also increased the germination percentage and the highest amount (83%) was related to 50 mg lit<sup>-1</sup> of gibberellin. In conclusion, Cd stimulated the pumpkin seed germination, but inhibited the subsequent seedling growth and priming improved the seedling growth in the presence of Cd.

**Keywords:** Pumpkin, Cadmium, Gibberellin, Germination

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**Effects of Different Extraction Solvents and Different Cultivation Environments on Californidine Content of California Poppy.**

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The California poppy (*Eschscholzia californica* Cham.) contains a variety of natural compounds including several alkaloids found exclusively in this plant. The main alkaloid known in this plant is Californidine with sedative, anxiolytic, and analgesic effects [1]. Due to the importance of this alkaloid, it is necessary to optimize the best method of extraction and appropriate environment for cultivation of this plant in order to achieve the highest level of californidine. In this study effects of three different extraction methods (hydroalcoholic, methanolic and aqueous solvents) and three different environments of Iran (Dezful, Torbat and Mahallat) on Californidine content of *Eschscholzia californica* aerial part have been investigated. According to the HPLC analysis, extraction by hydroalcoholic and methanolic solvents resulted amounts of 9.82 (mg/g dry weight) and 9.64 (mg/g dry weight) of californidine that they were the most efficient methods of extraction. Also, among the three different regions of cultivation, plants cultivated in Torbat showed the highest level of californidine with amount of 7.64 (mg/g dry weight).

**Keywords:** *Eschscholzia Californica*, Californidine

**References**

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**Evaluation of UV Radiation Effects on some Growth Parameters, Pigments and Antioxidant Enzymes Activity at Early Developmental Stages of *Dracocephalum moldavica*.**

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During the last decades, global stratospheric ozone has significantly damaged. The growing ozone depletion could lead to an increase of solar UV radiation reaching the Earth's surface. The increase of ultraviolet radiation can have many direct or indirect deleterious effects on the living organisms, including human, animals and plants. The purpose of this study was to investigate the effects of Ultraviolet radiation (under 320nm) on some growth parameters, pigments and antioxidant activities of *Dracocephalum moldavica* as herbal medicine that has the feature of antioxidant activity and antiseptic, analgesic, anti-inflammatory, anticonvulsive, wound healing, and antitumor properties. In 2-4 pair leaf stage, 6 doses of UV radiation (7, 15, 22, 30, 37, 51 kJm<sup>-2</sup>d<sup>-1</sup>) was used. Data were analyzed using SPSS software and ANOVA test. Our results showed that UV doses decreased growth parameters of root and shoot (fresh weight, dry weight, length of root and shoot), pigments (Chl a, Chl b and Total Chl). UV had no significant effect on carotenoids but increased anthocyanin contents. However the highest doses of UV enhanced activity of catalase and peroxidase but decreased superoxide dismutase and ascorbat peroxidase antioxidant activities.

**Keywords:** *Dracocephalum moldavica*, Growth parameters, Pigments, Antioxidant enzymes



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## The Effect of Different Concentrations of Zeatin and Dikegulac on Micropropagation of *Highbush Blueberry*

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In recent years, blueberry is popularly consumed in human diet due to its high antioxidant content. Therefore, the attempt to cultivate this plant is increasing in Iran. In order to deal with the increased demand for blueberry plants for cultivation, tissue culture can be the most appropriate method to propagate it. The aim of this research was also to optimize the micropropagation protocol of blueberry. For this purpose, the effects of different concentrations of zeatin and dikegulac on *in vitro* multiplication rate of blueberry were investigated. Microshoots of two different blueberry varieties including bluecorp and chandler were cultured in WPM culture medium supplemented with different concentrations of zeatin and dikegulac. After two months, the length and number of produced shoots were measured. The results showed that zeatin in combination with dikegulac did not significantly increase average shoot number and shoot length. In both cultivars, the highest number of shoots and highest length were obtained medium supplemented with zeatin without dikegulac. This study showed that zeatin but not dikegulac had positive effects on *in vitro* proliferation rate and growth of blueberry varieties.

**Keywords:** Blueberry, Dikegulac, Micropropagation

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## Effect of Solid Lipid Nanoparticles Containing Chamomile Essential oil on Leishmania Major.

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Leishmaniasis is a common parasitic disease in the world and is one of the health challenges of most countries in the world, especially in Iran. Treatments that are used to treat leishmaniasis, especially antimony compounds, in addition to the toxicity and side effects of drugs with problems such as resistance to drugs, painful use (injections in the lesion), as well as high costs of treatment. The same causes have caused the traditional medicine and the effectiveness of the plants to be considered for the treatment of this disease. The use of herbal essential oils in pharmaceutical and therapeutic applications faces problems such as instability, evaporation and degradation to environmental conditions. One of the newest methods for using these nanoparticles is to use them to solve these problems. In this study, SLN solid lipid nanoparticles were used to load chamomile essential oil. The positive effect of Chamomile on Leishmania parasites has already been confirmed. Nanoparticles have been used to increase the stability and effect of the drug, as well as to improve the essential oil effect on the parasite. The effectiveness of the formulations prepared on the Leishmania parasite was investigated by MTT method. In all tests, the culture medium containing the parasite was considered as control without adding the drug. Preparation of lipid nanoparticles containing essential oil was prepared by high-pressure compression and ultrasonography. Formulation components include stearic acid, chamomile essential oil in fat phase and 188 voloxamers in aqueous phase. The results of MTT test were significantly different in the control groups and the treated groups with the drug. Therefore, it can be concluded that the present formulation has been effective in controlling and eliminating the Leishmania Major parasite. Due to the desired effect of the drug, further studies are expected to provide effective drugs for the treatment of leishmaniasis.



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## Effects of Shilajit in Improving Burn in Rats.

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The most important factor in healing wounds, especially, the wound of burn, is prevention of its infection. Most deaths from burn wound are as a result of entering of infection into the bloodstream. *Pseudomonas aeruginosa* is a major factor of infection in wounds. Shilajit is the natural compound derived from plants in the rocky mountains. Research has shown this substance has inhibitory effect on *Pseudomonas aeruginosa* growth. According to role of this substance in traditional medicine and its application in the treatment of diseases, particularly fractures, the aim of this study is to investigate the effects of Shilajit on burn wound healing in rats. Experiments were done on three groups of mice that were burned, with 10 repetitions. The control group did not receive any restorative material. For other group, Shilajit solution with a concentration of 18 grams per deciliter was used for wound healing. For the third group was used Silversulfadiazine ointment on the burns. Percent improvement in different days of starting treatment, were calculated with the Feragson and Logan formula. Treatments were compared by using SPSS software. The results showed that the use of Shilajit has statistically significant difference compared to the control and use of ointment. It seems this healing associated with Shilajit inhibitory effects on the growth of bacteria.

**Keywords:** Shilajit, Rat, Burn

**Reference:** [1] Dinpe, Iacopinoam., *J period on il.*, 1997, 68: 37580.

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## Assessment of Antigenotoxicity Effects of Phenolic Rich Fraction of *Rosa canina* Fruits on Human Peripheral Lymphocytes Exposed to Oxidative Stress.

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Natural products have been widely considered as novel therapeutic agents for prevention of diseases related to oxidative damages [1]. *Rosa canina* fruits have different biological effects such as antioxidant, antidiabetic as well as pain relief in osteoarthritis. The present study was aimed to evaluate protection activity of polyphenol rich fraction of *Rosa canina* fruits on human lymphocyte DNA damage induced by H<sub>2</sub>O<sub>2</sub>. This fraction was known as powerful antioxidant in our previous study. Lymphocytes were isolated from blood samples of healthy volunteers. These cells were treated with various concentrations of fraction (25, 50 and 100 µg/ml) alone or they were treated with combination of these concentrations and 50 µM H<sub>2</sub>O<sub>2</sub> simultaneously, for 30 min at 4°C. DNA damages were measured using alkaline single-cell electrophoresis technique (comet assay). The results (DNA damage) were presented as percentage of DNA in the tail. The results showed that 50 µM of H<sub>2</sub>O<sub>2</sub> caused serious DNA damages, DNA tail percentage was about 30%, so there is significant difference between DNA damages of H<sub>2</sub>O<sub>2</sub> treated cells and controls (p < 0.05). Lymphocyte were treated by fraction (25, 50 and 100 µg/ml) did not show any genotoxicity in comparison to the control. DNA damage induced by H<sub>2</sub>O<sub>2</sub> diminished significantly by 25, 50 and 100 µg/ml of the fraction and the DNA tail percentage decreased from 30% to about 10%. We suggest that *Rosa canina* fruits protect human lymphocyte against oxidative DNA damage and its ability might be related to the presence of phenolic compounds with antioxidant activity. It might be considered as supplement in free-radical-induced diseases treatment.

**Keywords:** *Rosa canina*, Antigenotoxicity, DNA damage, Oxidative stress

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## Phenolic Compounds at Different Organs of *Linum album*.

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Lignans and flavonoids are widely distributed phenolics in the plant kingdom. Aryltetralin type lignans (podophyllotoxin derivatives) as the major secondary metabolites of *Linum* species play an important role in the production of chemo therapy drugs, treatment of hepatitis viral and protection of liver. In the present study, lignans and flavonoid compounds from different organs of *Linum album* that an endemic species from Linaceae growing wild in Iran. The phytochemical investigation has been collected from taleghan and determination of flavonoids and lignans compound carried out by HPLC. Result showed that vitixin, diosmin were in root, apigenine and kamferol were in shoot and other flavonoids compound were in all organs but narenginin were significantly greater in flowers. Compared to the roots and shoots; Myricetin, dadzein, catechin, resveratrol were significantly greater in roots. Compared to the flowers and shoots and genistein was significantly greater in shoot. Compared to the flowers and roots. Level of podophyllotoxin was significantly greater in flowers compared to the root and leaves. 6-methoxypodophyllotoxin was greater in root compared with other organs.

**Keywords:** Lignan, Podophyllotoxin, 6-methoxypodophyllotoxin, Flavonoids

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## Effect of Larvicide of Rosemary and Peppermint Essential Oil on Colex Mosquitoes.

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Mosquitoes play a significant role in the transmission of diseases to humans, most notably culex mosquitoes that transmit diseases such as filer worms, Rift virus, Neil virus . Mosquito control is difficult because of the advent of resistance to many insecticides. Traditional artificial insecticides are fast and effective pest control methods. But due to their adverse effects on the environment and non-target organisms, there is a growing need to find new and safe alternatives to pest control. Herbal extracts have the greatest hope because they are non-polluting, degrading and less harmful to the environment. Essential oils extracted from some plants have good fecal and intrusive properties that can be a potential alternative to chemical pesticides. Herbal Essential oil have a wide range of secondary metabolites that do not play a role in biochemical processes of the plant, but in plant ecological relationships, especially plant and insect interactions. Essential oil are a group of high-tech chemical compounds that are considered to be seriously human due to their low risk and anti-insect properties such as insecticide, insect repellency, nutritional inhibition and spawning. These compounds also affect most biological parameters, including growth rate, longevity and reproduction of insect. This study investigates the effect of larvae of Rosemary and Peppermint essential oils on larvae of Culex mosquitoes. In order to carry out this study, the Qara-Karez River, which crosses the Khondab city, late in spring and early summer, the ponds that have been created, some lobes of the mosquito colaks are collected and transferred to the lab. In the laboratory, we prepare each concentrate for each essential oil, and then add 10 lobes to it. In 5 minutes, we transfer the larvae to the substrate environment.

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## Performance of Broiler Chickens under Conditions of in-ovo Injection and Administration of Licorice and Colloidal nano Silver in the Replacement of Antibiotics During Growth after Hatch.

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The aim of the study was to analyze how application of per os licorice extract (LE) (*Glycyrrhiza glabra*) and colloidal nano silver (CNS) affect the performance status of ross broiler chickens in both embryonic and growth period. In Embryonic period Eight hundred Fertilized commercial eggs were randomly assigned to one of 10 treatments with five replicates (20 eggs each replicate). This experiment was arranged based on a completely randomized design (CRD). First group was control (without injection), second group was control (0.1 cc injection of Sterilized distilled water) and groups from third to ten were included 0.1 cc injection both LE in three levels (0, 100 and 200 ppm) and CNS in three (0, 30 and 60 ppm), in form of alone and combination with each other. For Growing period after hatch, the best treatments in first step were choosed and transferred to this step. Treatments consisted of two control groups from first step and other group treated in diet with both LE in three levels (0, 1 and 2 gr/kg) and CNS in two levels (0 and 120 ppm) in form of alone or combination with each other and a group treated with antibiotic. Injection of 60 ppm CNS and 100 ppm LE increased significantly hatchability percent in comparison other treatments ( $p < 0.05$ ). The chicks body weight and length after hatch was increased significantly in all treatment (especially in treatment with the highest levels of CNS and LE) than two control groups ( $p < 0.05$ ). There was a significant difference between 450 mg/kg Antibiotic and control group with other treatments ( $P < 0.05$ ). The highest FCR occurred by these treatments. There wasn't any difference between treatment consist of CNS and LE. But the chickens treated with 120 mg/kg CNS and 2gr/kg LE+ 120 mg/kg CNS had the lowest FCR. Production index significantly affected by treatments ( $P < 0.05$ ). The chickens consumed 120 mg/kg CNS and 2gr/kg LE+ 120 mg/kg CNS compared to chickens treated with 450 mg/kg Antibiotic showed the highest Production index. Inovo administration of glucose showed weight of newly-hatched chickens and final body weight of chickens in the group that received glucose injection was higher than control and sham group ( $p < 0.01$ ). Similar to the results of this research the silver nanoparticles had no effect on embryo development, and no signifcant differences in hatching parameters (hatchability and hatching weight). These findings indicated that licorice and colloidal nano silver singly or in combination with each other can affect positively performance of chickens.

**Keywords:** Hatchability, Feed conversion ratio, Body weight gain, Production index

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## Evaluation of some Quality Control Parameters of *Zataria multiflora* Boiss. Samples Prepared from Herbal market of Tehran.

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There is an increasing awareness and general acceptability of the herbal sources in today's medical practice. Due to these increased interest, performing quality control of plants to prevent mistakes and adulterations in the herbal markets is demanded. *Zataria multiflora* Boiss. (Lamiaceae family), locally called "Avishan-e Shirazi" in Iran, could be available from the herbal markets and widely used as an antiseptic, anesthetic, antispasmodic for the treatment of many diseases such as premenstrual pain, sore throat, neuralgia and edema in traditional medicine. The aim of this study was to evaluate some quality control of "Avishan-e Shirazi" samples purchased from some herbal markets and compare them each together. After purchasing of "Avishan-e Shirazi" samples from popular herbal markets in Tehran in 1394, they were tested for bacterial contamination in accordance with WHO protocols. Also the HPTLC fingerprints of methanol extract of the herbal samples and essential oil compounds by GC/MS were obtained. According to the microbial results, the presence of *E. coli* was approved 20% of the samples. The major compounds of essential oil consisted of carvacrol (22-49%), thymol (14-34%), cymene (3-9%) and linalool (0.4- 5.5%). The HPTLC fingerprinting of all extracts were showed similar pattern. Considering the obtained microbial results of "Avishan-e Shirazi" samples prepared from markets, there is a need for microbial assessments before use of the plants. There are differences between the amount of major compounds in the samples prepared from markets that may be related to the season or place of the collection. Therefore, gas chromatographic analysis of essential oils could be necessary for their standardization.

**Keywords:** *Zataria multiflora*, Avishan-e Shirazi, Physicochemical control, Quality control

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## Evaluation of Antifungal Activity of Three Plants Methanolic Extract Fractions Against Aflatoxin and OTA Producing *Aspergillus* Species.

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The contamination of agricultural and food products with saprophytic fungi producing carcinogenic toxins is one of the main concerns of manufacturers, distributors and exporters of these products; on the other hand, the use of chemical compounds is not possible due to adverse effects on the environment and the consumers. During the past several years' studies on essential oils, natural extracts and their fractions have shown that they have a very important antibiotic effect. In recent years, the use of antifungal drugs in the therapy of fungal diseases led to development of antifungal resistance. One of the new therapeutic strategies is by using combination therapies. One of the most harmful mycotoxins in agricultural products are produced by genus *Aspergillus*, the most important toxin producers in the country. In the present study, two species *A. flavus* as the most important agent in aflatoxin production and *A. ochraceus* as an agent for producing ochratoxin were studied. In this study, Three Iranian herbs, *Zataria multiflora*, *Ruta graveolens* and *Thymus kotschyianus* were collected and screened for antifungal effects based on traditional medicine and previous research. The total methanolic extracts of plants and their various fractions based on polarity were obtained and then evaluated against the production of aflatoxin and ochratoxin. The results showed that non-polar and polar compounds in hexane and ethyl acetate fractions of two species of *Ruta graveolens* and *Zataria multiflora* have the greatest effect on control of toxin production by these two species of *Aspergillus*. Although the metabolic pathway of toxin production and vegetative growth of the fungi are different, the compounds in the two hexane fractions and ethyl acetate have the greatest effect on controlling both parameters (vegetative growth and toxin production). The combination of these two fractions can be used to increase the potential for these compounds.

**Keywords:** Antifungal effect, Aflatoxin, Ochratoxin, *Ruta graveolens*, *Zataria multiflora*

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## ***In Vitro* Evaluation of Antimicrobial Activity from Methanolic Extracts of Three Medicinal Plants.**

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Increase in the infectious diseases and resistance of the bacterial pathogens to the available drugs is a serious problem recently. Medicinal plants are one of the most important sources for medicines. Herbal antimicrobial compounds are easily accessible and cheaper with minimal side effects. The some medicine plants and their application for treatment of particular diseases are recognised through traditional medicine. Plants with potency of antimicrobial activity should be tested against some microbes to confirm their activity. The activity of plant extracts against microbial agents such as bacteria and fungi has been studied by a large number of researchers in all over the world. The screening of the plant extracts has been a great interest to scientists in research for new drugs for effective treatment of several diseases. Three plant species, *Salvia hypoleuca*, *Mentha longifolia*, and *Zataria multiflora* collected from different districts of Iran and their methanolic extracts were obtained by percolation method. Antibacterial and antifungal assay of crude extracts were tested against two Gram-positive bacteria (*Bacillus subtilis*, *Staphylococcus aureus*) and two Gram-negative bacteria (*Escherichia coli* and *Pseudomonas aeruginosa*), and two fungi *Aspergillus flavus* and *A.ochraceus* using microdilution technique. The result shows that, minimum inhibition concentration (MIC) of the *S.hypoleuca* and *Z. multiflora* methanolic extracts was 2.5 mg/mL for *B. Subtilis* and *St. aureus*. The extracts of *Z. multiflora* showed higher inhibitory activity against the fungi *A. ochraceus* and *A. flavus* than the others. The result of this research supports traditional medicine use of different plant extracts in treating some infections that caused by pathogenic fungi and bacteria. It also offers that a great attention should be on effective medicinal plants which have pharmacological properties that could be better to improve human and animal health.

**Keywords:** Antifungal activity, Antibacterial Activity, Medicinal plant, *Zataria multiflora*

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## **Evaluation of Phenol and Flavonoid Content of Ethanolic and Methanolic Extracts of (*Rosa canina*. L) in Lorestan.**

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Dog Rose (*Rosa canina* L.) is a wild native species in Iran, that belonging to *Rosa* genus in the Rosaceae family. The *Rosa canina* fruits are a valuable source for food and pharmaceutical industry. They contain a wide variety of biologically and physiologically active ingredients, such as vitamins (C, B, E, K), flavonoids, carotenes, carbohydrates, organic acids, trace elements and others [1]. In order to study the Evaluation of phenol and flavonoid content of ethanolic and methanolic extracts of (*Rosa canina*. L) in Lorestan, (Nurabad, KhorramAbad, Aleshtar, Dorud and Aligudarz), an experiment was conducted as a randomized complete block design with six replications in 2018. Results showed that, The highest content of phenol and flavonoid in both methods was observed in Nurabad population. Most of phenol (50.81, 25 µg gallic acid/ mg dry extract) and flavonoids (22.81, 16.29 µg rutin/ mg dry extract) in ethanol and methanol extracts, Respectively.

**Keywords:** Medical plants, Nurabad, Rosa, Fruits

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## Green and Chemically Synthesize of Copper Oxide Nanoparticles and Assessing Their Toxicity on Tobacco Cell Cultures

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Nanotechnology has quite a lot of applications in various fields of industrial sectors like food and agriculture. Although nanotechnology can improve the quality of life, its possible associated risks should be assessed. Copper oxide nanoparticles (CuO NPs) have attracted high attention due to their catalytic, electric, optical, photonic, textile, nanofluid, and antibacterial properties. In the present work, we synthesized CuO NPs using *Berberis thunbergii* aquatic leaf extract and explored its potential toxicity in comparison with chemically synthesized CuO NPs. X-ray diffraction studies showed that the particles are monoclinic in nature. SEM images revealed that the particles are spherical in shape with an average size of 44 nm. Further, a cell biology approach was applied to evaluate the toxic effects of biologically and chemically synthesized CuO NPs on tobacco cell suspension cultures. Both types of CuO NPs significantly dropped the viability of the cells in a dose and time dependent manner. The 48 h IC<sub>50</sub> value was 32.47 mg L<sup>-1</sup> for green synthesized CuO NPs that was 2.71 times higher than 48 h IC<sub>50</sub> value of chemically synthesized CuO NPs, clearly confirming the lower toxicity of green synthesized CuO NPs. According to our results, it can be concluded that the remnants of organic components of the plant extract on the surface of green synthesized CuO NPs may reduce their toxicity effects.

**Keywords:** Copper oxide nanoparticles, *Berberis thunbergii*, Toxicity, Tobacco cells

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## In Vitro Cytotoxic Activities of Three Medicine Plant Extracts on Hela Cancer Cell Line

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Medicinal plant has been used for maintaining and improving health, enhancing immune system function, disease prevention, therapy and reduction of cancer in the world over the past years. By introducing the natural compounds with less effect on healthy cells and specific affect cancer cells, these natural product could be use as chemopreventive and chemotherapeutic agent. Many traditional medicines have considerable biological activities with potential therapeutic usage. The aim of present study was performed to investigate in vitro cytotoxic activity of three methanolic extracts against Hela cancer cell line to validate their cytotoxic potential. Three plants, *Salvia hypoleuca*, *Thymus kotschyanus*, and *Zataria multiflora* collected from different districts of Iran, and their methanolic extracts were obtained by percolation method. Their methanolic extracts were tested for their possible antitumor activity and cytotoxicity by using the 3-(4,5-dimethyl thiazol-2-yl) -2,5- diphenyl tetrazolium bromide (MTT) assay on Hela cancer cell line. *Salvia hypoleuca* showed the best inhibition of cell proliferation. IC<sub>50</sub> values was 0.625 mg/ml for the first 24 hours. The highest cytotoxic activity was *Salvia hypoleuca* > *Zataria multiflora* > *Thymus kotschyanus* respectively. The result of this research offer that a large number of extracts demonstrate success cytotoxicity activity as a natural resource for future bio-guided isolation of potential antitumor agents.

**Keywords:** Cytotoxic effect, Medicinal plant, *Salvia hypoleuca*, Hela cancer

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## Effect of Priming with Auxin and Gibberellin on the Germination of Medicinal Pumpkin (*Cucurbita pepo*) Seed under Copper Chloride Stress

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Copper is a heavy metal which causes toxicity of plants through oxygen radical production at high concentration. In order to investigate the effect of priming with auxin and Gibberellin on the germination of medicinal pumpkin (*Cucurbita pepo*) seed in the presence of copper (Cu) a factorial experiment was conducted based on completely randomized design with three replications. Treatments were different concentrations of gibberellin and auxin (0, 25 and 50 mg lit<sup>-1</sup>) and copper chloride (0, 100 and 200 mg lit<sup>-1</sup>). The results showed that the interactions between copper chloride and auxin on the rate and percentage of germination were significant. The highest percentage and rate of germination (89% and 5.15 day<sup>-1</sup>, respectively) observed in 50 mg lit<sup>-1</sup> of auxin and 200 mg lit<sup>-1</sup> of Cu. The highest germination percentage (89%) observed in 200 mg lit<sup>-1</sup> of Cu, but highest dry and fresh weight of seedling observed in 25 mg lit<sup>-1</sup> of gibberellin. In conclusion, the interaction of copper and auxin increased the rate of germination, but in the case of seedling growth toxicity of Cu compensated by auxin priming and gibberellin alleviated the effect of copper toxicity and improved the seedling growth under copper stress.

**Keywords:** Copper chloride, Priming, Auxin, Gibberellin, Germination

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## Phyto-Pharmacological Properties of *Morus alba* L. on Thyroid Tumor Cell Line.

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Thyroid cancer is a common carcinoma with increasing rate over the past 20 years. Human thyroid cancer cell lines are broadly utilized to investigate the mechanisms in related to thyroid carcinogenesis. Nevertheless, the B-CPAP cell line is one of the few cell lines that there are limited availability of non-cross-contaminated cancer cell lines derivative from papillary thyroid carcinoma. *The previous investigations demonstrated that* the aqueous and ethanol extracts from leaves of *Morus alba* L. with significant amount of digestive proteins, carbohydrates, micro- and macronutrients, polyphenols, free amino acids and organic acids, express phyto-pharmacological and nutritional profile. The mentioned profile leads to the wide range of significant biopharmaceutical activities of *M. alba* L. leaves such as antidiabetic, antibacterial, anticancer, cardiovascular, hypolipidemic, antioxidant, antiatherogenic, and anti-inflammatory properties. On the other hand, prior findings cleared that all-trans retinoic acid (ATRA) as one of the anti-tumor compounds demonstrates diverse anticancer effects on different types of tumor cell lines. On the subject of the pointed facts, current research has been carried out to investigate novel effective strategy towards suppressing B-CPAP tumor cell line based on phyto-pharmacological properties of *M. alba* L. leaves alone and in combination with ATRA. *M. alba* L. leaves were collected from South-West of Iran. Voucher herbarium sample of the herb is set and made accessible. The collected plant supplies were dried at room temperature for 4–7 days. Dried plant powder was extracted by 80% ethanol (Merck, Germany) based on the percolation method. After solvent evaporation, 10 mg of the extract was dissolved in 1 ml DMSO as stock. ATRA was obtained from Sigma, United States. B-CPAP tumor cell line was prepared from Biological Research Center, Iran. The cells were maintained in RPMI-1640 (Gibco, England) medium supplemented with 10% FCS (Gibco, England) in a humidified incubator (37 °C and 5% CO<sub>2</sub>). The cytotoxic properties of *M. alba* L. leaves (25-805 µg/ml) alone and in addition to single dose of ATRA (8 µM) were evaluated on B-CPAP tumor cell line (72 hour treatment time) by MTT assay. Finding from current investigation demonstrated the ethanol extract of *M. alba* L. leaves alone and in combination with ATRA can induce cytotoxicity effect with IC<sub>50</sub>s 79.831 µg/ml and 58.32 µg/ml on B-CPAP. This outcome can expose new strategy for thyroid cancer therapy in the frame of phyto-pharmacological based approaches.

**Keywords:** Thyroid; Cancer, *M. alba* L., ATRA

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**Effect of Different Nitrate to Ammonium Ratios on Yield, Total Phenolic and Flavonoid Content of Two Oregano Subspecies (*Origanum vulgare* ssp. *gracile* and *Origanum vulgare* ssp. *vulgare*) in Hydroponic Condition.**

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Nitrogen is one of the most important nutrients for plant growth and development. Plants can absorb nitrogen either as nitrate (NO<sub>3</sub><sup>-</sup>) or ammonium (NH<sub>4</sub><sup>+</sup>), and for optimal uptake and growth, each plant species requires a different nitrate/ammonium ratio. To study the effect of different NO<sub>3</sub><sup>-</sup>:NH<sub>4</sub><sup>+</sup> ratios (100:0, 75:25, 50:50 and 25:75) on yield, total phenolic and flavonoid content in hydroponically grown two oregano subspecies (*Origanum vulgare* ssp. *gracile* and *Origanum vulgare* ssp. *vulgare*), a pot experiment was conducted using a factorial based on completely randomized design with three replications. The results showed that different NO<sub>3</sub><sup>-</sup>:NH<sub>4</sub><sup>+</sup> ratios had significant effects on studied parameters. In both subspecies, fresh and dry herb yield decreased by decreasing NO<sub>3</sub><sup>-</sup>:NH<sub>4</sub><sup>+</sup> ratio. *O. vulgare* ssp. *vulgare* had more fresh and dry herb yield in all NO<sub>3</sub><sup>-</sup>:NH<sub>4</sub><sup>+</sup> ratios. In both subspecies, total phenolic and flavonoid content increased by decreasing NO<sub>3</sub><sup>-</sup>:NH<sub>4</sub><sup>+</sup> ratio. In the 25:75 NO<sub>3</sub><sup>-</sup>:NH<sub>4</sub><sup>+</sup> ratio, *O. vulgare* ssp. *gracile* (37.26 mg GAE/g fw) had more total phenolic content than *O. vulgare* ssp. *vulgare* (31.58 mg GAE/g fw) [1].

**Keywords:** Oregano, Nitrogen, Hydroponic, Yield, Phenolic content

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**Effect of Different NO<sub>3</sub><sup>-</sup>:NH<sub>4</sub><sup>+</sup> Ratios and Humic Substances Concentrations on Growth Parameters and Antioxidant Activity of Basil (*Ocimum basilicum*) in Hydroponic Condition.**

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Plants can absorb nitrogen either as nitrate (NO<sub>3</sub><sup>-</sup>) or ammonium (NH<sub>4</sub><sup>+</sup>), and for optimal uptake and growth, each plant species requires a different nitrate/ammonium ratio. To study the effects of two NO<sub>3</sub><sup>-</sup>:NH<sub>4</sub><sup>+</sup> ratios (80:20 and 20:80) and four concentrations of humic substances (0, 15, 30 and 45 mg/l) on growth parameters and antioxidant activity in hydroponically grown basil (*Ocimum basilicum*), a pot experiment was conducted using a factorial based on completely randomized design with three replications. The antioxidant activity of metanolic extracts was evaluated using 2, 2-diphenyl-1-picrylhydrazyl (DPPH). The results showed that different NO<sub>3</sub><sup>-</sup>:NH<sub>4</sub><sup>+</sup> ratios and humic substances concentrations had significant effects on studied parameters. In both NO<sub>3</sub><sup>-</sup>:NH<sub>4</sub><sup>+</sup> ratios, growth parameters (plant height, leaf area, fresh and dry weight of leaves and stems) increased by increasing humic substances concentration. In the 80:20 NO<sub>3</sub><sup>-</sup>:NH<sub>4</sub><sup>+</sup> ratio, antioxidant activity decreased by increasing humic substances concentration. Overall the findings of this study showed that plants grown in higher ratio of ammonium had higher growth parameters and antioxidant activity [1].

**Keywords:** Basil, Nitrogen, Hydroponic, Plant height, DPPH

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**Evaluation of Plant Density and Chemical Fertilizer (nitrogen) on Yield, Yield Components and Gum in Guar (*Cyamopsis tetragonoloba* L.).**

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Guar, *Cyamopsis tetragonoloba* L., is belonged to Leguminosae family, which has a short life cycle (3-4 months), and has the ability to grow and function properly in hot and dry climates with minimum water requirements. The main part of Guar, is seeds, contains gum galactomannan and is used in food and pharmaceutical industries. Guar meal is also used as a forage cattle. In this research, the effect of plant density and nitrogen fertilizer on the yield, yield components and percentage of gum in a randomized block design with four levels of nitrogen fertilizer including: N (N1), 50 (N2), 100 (N3) and 150 (N4) (kg ha<sup>-1</sup>) and plant density at three levels of 30 × 45 (D1), 30 × 60 (D2) and 45 × 45 (D3) cm in one agronomic year in Meybod province, Yazd province in 1396 was investigated. The data were analyzed using SPSS software and comparison of means with Duncan at 5% level. The results of data analysis showed that there was no significant difference between crop density, nitrogen fertilizer treatments and the interaction of these two factors with respect to seed yield. However, regarding gum percentage, there was a significant difference between the factors studied at 5% level. The result of this study shows that the treatment of 150 kg ha<sup>-1</sup> Nitrogen fertilizer and 30 × 60 density, possess the highest yield and gum percentage in the studied climate conditions.

**Keywords:** Guar, Plant density, Nitrogen fertilizer, Meybod, Legumes

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## Developmental Patterns of Emission in Floral Scent of *Rosa moscata* Herrm.

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*Persian musk rose (Rosa moschata* Herrm.) is one of the damask rose's parent. It grows widely in different geographical parts of Iran. Persian musk rose essential oil, scent and water, uses in traditional medicine and perfume industry for a long time. In the current study, the stage of flower development that has highest odor, was determined. Chemical compounds of *R. moschata* flower were isolated and determined in four stages of flowering by head-space. Phenylethyl alcohol,  $\alpha$ -pinene, eugenol and 1-nonadecene were major compounds. Phenylethyl alcohol content increased by flower opening to the fourth stage which showed the highest amount (82/42%). The highest content of  $\alpha$ -pinene was observed at the first stage (42.86%). In addition, the third stage showed maximum content of Eugenol (30.11%).

**Keywords:** Persian Musk Rose, Phenyl ethyl alcohol, Flower Development

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## Trigonella Foenum-Graecum Seed Extract, Diosgenine and 4-Hydroxyisoleucine Improve Dyslipidemia by Regulating the Expression of Genes Involved in Fat Metabolism.

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Effects of hydroalcoholic extract of fenugreek seeds, Diosgenine and 4-Hydroxyisoleucine on lipid metabolism in HepG2 cell line. Dyslipidemia is a disorder in the metabolism of lipids and lipoproteins, which leads to an increase in total cholesterol (TC), Low density lipoprotein (LDL-C), triglyceride (TG) and decreased High density lipoprotein (HDL-C). Disorders of lipid metabolism are associated with dyslipidemia, diabetes, cardiovascular disease and obesity, and their associated disorders. Fenugreek is a plant with many medicinal properties. Diosignin and 4-Hydroxyisulosin are two active ingredients of Fenugreek, which that contribute to the regulation of glucose and lipid metabolism. HepG2 cells were cultured in RPMI1640 medium. The cells were treated for 24 and 48 hours with the extract of Fenugreek seeds, Diosignin and 4 hydroxyisulosin. IC50 was calculated using MTT method. After extracting RNA and synthesizing cDNA, the expression of the expression of LXR $\alpha$ , PPAR $\gamma$ , SREBP-1C, FAS, ACC, FGF21 and LDLR genes was evaluated by Real Time PCR method. *The results showed that the expression of genes LXR $\alpha$  (P<0/001), PPAR $\gamma$  (P=0/033), SREBP-1C (P<0/001) and its target genes, including FAS (P=0/033) and ACC (P<0/001) in the HepG2 cell line decreased significantly after 24 and 48 hours of treatment with extract, diosignine and 4-hydroxyisulosine. also, the expression of FGF21 and LDLR genes showed a significant increase (P<0/001). Our data suggest that the extract of Fenugreek seeds, Diosignin and 4-hydroxyisulosin have potential hypoplipidemic effects and can be used as an appropriate candidate to improve dyslipidemia and metabolic disorders associated with it.*

**Keyword:** Fenugreek seeds extract, Diosgenine, 4-Hydroxyisoleucine, Dyslipidemia

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**Evaluation Leishmanicidal Effect of Combination *Plantago major* L., *Nigella sativa*, *Matricaria chamomilla* L. and *Plantago ovata* Extracts by In vitro Leishmanicidal Assay Using Promastigotes of *Leishmania major*.**

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Leishmaniasis is one of the six major parasitic diseases in the tropical regions of the world. In the wake of resistance to pentavalent antimonial drugs, new therapeutic alternatives are desirable. The plant kingdom has in the past provided several affordable compounds. Natural products may offer an unlimited source of chemical diversity to identify new drug modules. New medicines should be less toxic or non-toxic, safe, more efficient, less expensive and readily available antileishmanial agents, especially for low-income populations. The bioactive phytochemicals present in the plant derivatives including the crude extracts and other useful compounds can be a good source for discovering and producing new antileishmanial medicines. This study was to investigate the anti-leishmaniasis effect of combination aqueous extracts of *plantago major* L., *nigella sativa*, *matricaria chamomilla* L. and *plantago ovata*, and compare it with glucantime. The aqueous extracts this were obtained by maceration. *Leishmania major* promastigotes were cultured at 25±2°C in stationary phase in RPMI-1640 medium complemented with 20% FCS, penicillin and gentamicin antibiotics. Concentrations of 25, 50 and 100 µg/ml of aqueous extracts were adjacent to 24, 48 and 72 hours with *leishmaniasis major* promastigotes and their effects were investigated by MTT. IC<sub>50</sub> of herbal combination and glucantim were 10/21 and 18/28 µg/ml respectively. The results of this study indicate inhibitory effect of growth this aqueous extract combination on promastigote forms of *leishmania major*; therefore, it is suggested that further studies to find out the anti-leishmanial effect of this plants combination on amastigotes forms of this parasites will happen [1,2].

**Key words:** Aqueous extracts, Herbal combination, *leishmania major*

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**Effect of Cultivation Date and Plant Spacing on the Control of Diseases of Roselle (*Hibiscus sabdariffa* L.)**

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Selecting appropriate planting date and density is one way of organic production of agricultural products and to minimize the use of chemical pesticides. This is very important especially in the case of medicinal plants. Roselle (*Hibiscus sabdariffa*) is an annual plant of the family Malvaceae. The plant is considered to have antihypertensive properties. Roselle also, has been used in folk medicine as a diuretic, mild laxative, and treatment for cardiac and nerve diseases and cancer. The calyxes of plant are rich in anthocyanins, as well as protocatechuic acid. In order to investigate the effect of cultivation date and density on control of diseases of Roselle (*Hibiscus sabdariffa*), an experiment was conducted at farm located in the city of Darab, Fars, in 2013. A split-plot layout based on randomized complete block design with three replications was used. Cultivation data (25 March, 15 April, and 15 May) were allocated to main plots and density (50\*50, 50\*75 and 50\*100 cm) allocated to sub plots. Results showed that cultivation date and density had a significant effect on the incidence of root rot diseases of roselle. The highest rate of root rot in March (61.73%) and lowest rate was observed in April and May planting (31.41% and 31.64%, respectively). Also in 50\*50 cm plant spacing the greatest rate of root rot was observed (50.24%), but in the third plant spacing (50\*100 cm) this rate of root rot was observed 26.65%. In this study, planting date May with plant spacing of 50\*100 cm have the lowest rates of diseases.

**Keywords:** Roselle, Cultivation date, Plant spacing, Root rot, Organic production

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## Development and Validation of a GC-FID Method for the Simultaneous Determination of Methanol and Major Components of Thyme Aromatic Water.

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Herbal aromatic waters are one of the most commonly used forms of herbal products in Iran, especially in traditional medicine. The genus *Thymus* is one of the most important genera within the Labiatae family, with regard to the number of species included. The common word, thyme, has been used to name both the genus and its most commercially used species, *Thymus vulgaris*. Thyme is an aromatic plant used for medicinal and spice purposes almost everywhere in the world [1]. Thyme aromatic water is one of the most popular herbal aromatic waters in Iran. Two major components in the essential oil and aromatic water of thyme are thymol and carvacrol [2]. On the other hand, methanol can be produced in the growing stages of the plant and in the process of distillation and storage. The aim of this study was development and validation of a GC-FID method for the simultaneous determination of methanol, thymol and carvacrol in thyme water. In this study, thyme aromatic water was extracted by distillation and was analyzed by GC-FID. Methanol and an internal standard, as well as thymol and carvacrol in different concentrations were injected to the GC column. All of the experiments were performed in three replicates. Temperature programming and the elution time of the column were optimized. Finally, the best conditions were developed. The initial and terminal oven temperature was 40 and 250 °C. The total test time was 16.5 minutes. Thus, for the first time, a reliable analysis method was achieved to measure methanol, thymol and carvacrol simultaneously in thyme aromatic water.

**Keywords:** Methanol, Major Components, Thyme Aromatic Water

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## The Role of Clove Oil in Eliminating Saprolegnia in Rainbow Trout.

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*Eugenia caryophyllata* (clove) is a family of Myrtaceae. It is a cone-shaped tree whose leaves are never yellow and green throughout the year. Clove essence is obtained from steam distillation from leaves and flowering branches. Clove oil is used in food and pharmaceutical industries. The aim of this study was to evaluate the interactions of antimicrobial and antifungal essential oils of clove plants on *Saprolegnia* (agent of disease in fish). To evaluate the antifungal properties of essential oil of clove, we first began to prepare essential oils. Then Contaminated fish to *Saprelugenia* fungus are isolated. they are impregnated with different concentrations of clove oil (100, 200, 300, 400) ppm. we examined the growth of the fungi. The most effective concentrations of Clove Oil were 300 ppm. The obtained results are analyzed using the SPSS software and compared with Duncan test.

**Keyword:** Clove oil, *Saprolegnia*, Rainbow trout

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## Hemato-Biochemical Parameters in Rainbow Trout (*Oncorhynchus mykiss*) Following the Diet Supplemented with Dwarf Elder (*Sambucus ebulus*).

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The manipulation and control of fish health and production by herbs has been identified as an important area for future developments in aquaculture. A study was conducted to investigate the effect dwarf elder (*Sambucus ebulus*) on haematological and biochemical parameters of rainbow trout (*Oncorhynchus mykiss*) under commercial farming conditions. Groups of 30 juvenile trout (51.2 g ± 1.6) were randomly allocated into 4 different treatments with three replicates each. The control group was fed a basal diet, while the other three groups were fed diets supplemented with 2.5%, 5% and 10% of dwarf elder. The fish were fed to apparent satiation for a period of 4 weeks. The use of dwarf elder did not significantly change the total red blood cell (RBC), haematocrit (Ht), haemoglobin (Hb), mean cell volume (MCV), mean cell haemoglobin (MCH), mean cell haemoglobin concentration (MCHC), alanine aminotransferase (AST) and aspartate aminotransferase (ALT) (P>0.05). After 4 weeks, the fish treated with dwarf elder exhibited significantly increase the total white blood cell (WBC) and neutrophils of 5 and 10% groups compared to the control and 2.5% group (P<0.05) and 5% group shown the highest WBC and neutrophils levels. Supplementing 2.5, 5 and 10% dwarf elder reduced the triglyceride (Tri), cholesterol (Chol) and glucose (Glu) compared to the control group. At the same time, dwarf elder supplementation increased total protein (TP) and albumin (Alb) levels significantly compared to control group. The results suggest that by using this herb there will be an improvement in hemato-biochemical parameters of juvenile rainbow trout.

**Keywords:** Total protein, *Sambucus ebulus*, Rainbow Trout

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## Survival and Photosynthesis of *Olea europaea* L. Seedling as Affected by Low Temperatures

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The European olive (*Olea europaea* L.) distributing in Mediterranean regions is a medical plant and its leaf extraction has antioxidant, antibacterial and anti-inflammation characteristics. It also reduces blood pressure and blood glucose and helps widening cardiac veins. In this investigation, two-year old potted seedlings of *O. europaea*, with averaged height of 30 cm, were provided from the nursery. The seedlings were placed in freezer, refrigerator and germinator with temperatures of -20, -16, -10, -7, -5, +2, +5, +10 and +16 °C for periods of 1 and 3 hours. Experiment was conducted as factorial in a completely random design (CRD) and 3 replicates. Since, in physiology, photosynthesis is known as an important factor for evaluation of plants tolerance to stress, so its measurement was taken before stress and repeated, along with recording the survival rate, on days of 4 and 12 after stress. The findings indicated that in -10, -16 and -20 °C (periods of 1 and 3 hours), survival was 100% on day 4 after stress but on day 12 after stress all seedlings were dead. In both periods of 1 and 3 hours examined after stress, photosynthesis rate decreased with decreased temperature of environment. Photosynthesis of seedlings maintained in temperatures of -16 and -20 °C was the minimum on day 4 after stress. Seedlings examined with temperatures -7 to +15 suffered photosynthesis disturbance immediately after stress but were able to recovery by day 12. In some days following the stress, the seedlings maintained for 1 hour (compared to 3 hours) in environments between -7 and +15 °C had higher photosynthesis rates. Considering to that no symptoms of hypothermia was appeared in seedlings examined up to -7 °C, it can be suggested that seedling of *O. europaea* is able to well tolerate such a freeze temperature.

**Keywords:** Medicinal plant, Photosynthesis, Olive, Recovery, Seedling survival

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## Effect of Cultivation Date and Plant Density on Yield and Quantitative Properties of Roselle (*Hibiscus sabdariffa*. L) in Climatic Condition of Darab.

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One of the important points in the the addition a new plant to the cropping pattern was the study of cultivation date and density in the region. The purpose of this investigation is to select the best cultivation time and density on yield and quantitative properties of Roselle (*Hibiscus sabdariffa*) in climatic condition of Darab. Roselle (*Hibiscus sabdariffa*) is an annual plant of the family Malvaceae. The commercial part used are calyx (sepals) that are rich in anthocyanins. In order to investigate the effect of cultivation data and density on yield and quantitative properties of Roselle such as plant height, number of branches, number of fruits per branch, the total number of fruits per plant and dry weight of sepals per plant, an experiment was conducted at farm located in the city of Darab, Fars, in 2013. A split-plot design based on randomized complete block design with three replications was used. Cultivation data (25March, 15April, and 15May) were allocated to main plots and density (50\*50, 50\*75 and 50\*100 cm<sup>2</sup>) allocated to sub plots. Results showed the maximum height of the planting date is March-April (206 cm at density of 50\*100) and May is the lowest height (168cm-density of 50\*75), the maximum of branch is April (29 branches at density of 50\*100) and the total number of fruits per plant is April (355 fruits at density of 50\*100 cm) which is equal to 54 grams of dried sepals in plant. Looks, April with density of 50\*100 cm is the best cultivation data for climate Darab.

**Keywords:** Roselle, Cultivation date, Density, Height, Branch, Dry weight

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## Evaluation of Sowing Date on Yield, Yield Components and Gum Content in Yazd Province- Meybod.

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Guar, *Cyamopsis tetragonoloba*. L. It is belonging to Leguminosae. It is tolerant to warm and dry weather conditions and there is less water requirement than other crops. The seed is the worthwhile part of guar, due to contain galactomannan gum and is used in food and pharmaceutical industries. In this research, Evaluation of three sowing dates, such as (June 10, 2017) (June 25, 2017) (July 24, 2017) On yield and yield components of guar (such as: root depth, branch height, seed number per plant, number of seeds per pod, number of branches, number of clusters per plant, Number of seeds per plant, gum percentage, weight of 100 seeds) in Meybod- Yazd province in the form of a randomized complete block design were evaluated. Data were analyzed using SPSS software and comparison of meanings with Duncan at 5% level. The results of data analysis showed that sowing date has significant effect on performance, performance components and gum percentage. The results of this study showed that sowing date in (June 10, 2017) devoted the best yield, while two other sowing dates; (June 25, 2017) and (July 24, 2017) has the maximum of gum.

**Keywords:** Guar, Sowing date, Gum, Meybod, Legumes

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## Renoprotective Effect of *Plantago Major* Against Proteinuria and Kidney Damage Induced by Adriamycin.

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Adriamycin (ADR) is one of the drugs that is used in the treatment of various cancers. Proteinuria and nephrotoxicity are among important side effects of ADR that limit its utilization. The most important factors that contribute to ADR side effects oxidative stress, inflammation and apoptosis. Considering the anti-inflammatory, anti-oxidant, effects of *Plantago major* (P.M), the aim of this study was to evaluate the effect of hydro-alcoholic extract of P.M on proteinuria and tissues damage caused by ADR in rats kidney. 40 male Wistar rats were randomly divided into 4 groups: 1-control 2-ADR (5 mg/kg, IV) 3- P.M (600mg/kg) + ADR 4- P.M (1200mg/kg) +ADR. The study period was 35 days. Animals were orally treated with P.M hydro-alcoholic extracts 70% for 6 days. Then ADR is administered intravenously on day 7 and extract continued for 28 days. Serum and urine samples were collected on days 0, 14, 21 and 28. Serum and urine concentrations of albumin also urine excretion rate protein were determined. In end of study animals were sacrificed and tissue damage in kidney were evaluated histopathological examination. ADR injection caused significant changes were in urine excretion rate protein. Consumption of extract P.M with two doses of 600 and 1200 improved urine excretion rate protein and serum albumin. As well as tissue damage caused by injecting ADR in the groups receiving the tow dose of P.M significantly reduced. The results of present study showed that the hydro-alcoholic extracts of P.M at doses used to reduced proteinuria and renal toxicity is caused by ADR, possibly via their antioxidant properties. However, future studies are required to determine the exact mechanisms involved in P.M effects on ADR induced kidney toxicity.

**Keywords:** Proteinuria, Adriamycin, *Plantago Major*

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## Protective Effect of Paprika in Prevention of Lipid Metabolism Changes Following Oxytetracycline Administration in Rats

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The purpose of this study was to investigate the effect of Paprika on the metabolism of lipids in the liver tissue following oxytetracycline administration in rats. A total of 36 adult male rats were divided into 6 equal groups and treated as follows. The control group (normal saline), fatty liver (oxytetracycline with dosage 120 mg/kg per day for 3 days), fatty liver group-1 treatment (oxytetracycline, intraperitoneal with a dose of 120 mg/kg for three days, then the extract of Paprika daily 75 mg/kg by stomach tube for thirty days), liver-fatty-therapeutic group (oxytetracycline, intraperitoneal at a dose of 120 mg/kg for three days, then Paprika per day 100 mg/kg by stomach tube for thirty days), treatment group 3 (Paprika 75 mg/kg daily with gastric tube for 15 days then oxytetracycline 120 mg/kg for three days) and treatment group 4 (Paprika 100 mg/kg daily with gastric tube for 15 days followed by oxytetracycline 120 mg/kg for 3 days. Pre-treatment with Paprika at dose 100 mg/kg resulted in a significant decrease in AST level compared to the control group ( $p < 0.05$ ). Pre-treatment of Paprika with a dose of 75 mg resulted in a significant decrease in ALT level compared to the control group ( $p < 0.01$ ). Also, pretreatment with Paprika at dose of 100 mg resulted in a significant decrease in ALT level compared to control, Fatty liver, fatty liver-treatment 1 and treatment group 3 ( $P < 0.001$ ). Serum total cholesterol level in the fatty liver group had a significant increase compared to control, fatty liver, Fatty liver-treatment, treatment groups 3 and 4 ( $P < 0.001$ ). The level of triglyceride in the fatty liver group was significantly higher than that of the treatment group 4 ( $P < 0.001$ ). The level of LDL in the treatment group 4 showed a significant increase compared to the control, fatty liver and fatty liver-treated groups ( $p < 0.01$ ) and in the treatment group 3 compared to the fatty liver and fatty liver groups ( $p < 0.01$ ). It seems that Paprika extract have a positive effect on the process of fatty liver and lipid metabolism changes in rats.





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## Screening for some Important Flavonoids in Chamomile Populations

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Chamomile (*Matricaria Chamomilla*) belonging to the Asteraceae family, is an annual plant indigenous to Europe and Asia. For centuries, it has been used as a medicinal plant because of its medicinal properties, including the relief of Sleeping Disorders, Diarrhea, Colic, wounds, Mucositis, and Eczema. In addition, anti-inflammatory, anti-spasmodic, anti-allergic, and anti-bacterial properties have been reported for Chamomile. Flavonoid Glycosides represent the major part of water-soluble components in Chamomile. The main Chamomile flavonoids are Apigenin, Luteolin, and Quercetin contributing to its anti-inflammatory, anti-spasmodic, and smooth muscle-relaxing effects, particularly in the gastrointestinal tract. This research was conducted using a nested design from 2017 to 2018 with 10 populations selected from Darehshahr, Abdanan, Ilam, Ivan, Moormoori, Ramin, Izeh, Baghmalek, MasjidSoleiman, Gotvand, Andimeshk, Salehshahre, and Dezfoul Chamomile flowers were harvested at full bloom stage in March and April and then dried in shaded room temperature. Extraction was done using an ultrasonic with methanol for three times. Flavonoids were evaluated by HPLC equipped with DAD detector. The Mobile phase was methanol and water. The screening of flavonoids was evaluated through presence or absence of Apigenin, Luteolin, Quercetin, Kaempferol, Eupafolin, Apigenin-7 Glucoside, Rutin, Hyperoside and Hispidulin. Apigenin was observed in Ilam, Abdanan, Moormoori, Ivan, Lali and Baghmalek populations. Similarly, Eupafolin was seen in all above-mentioned populations as well as Bodgold. Quercetin was observed in Ilam, Ivan, Baghmalek, Moormoori, MasjidSoleiman, and Abdanan. Apigenin-7-Glucoside was presented in all populations except Andimeshk and Masjid Soleiman. Luteolin was also found in all populations except Ramin, Andimeshk, and Salehshahr. Kaempferol has been registered in Ilam, Gotvand, and Bodgold. Hispidulin was observed only in Ramin and Moormoori. Hyperoside and Rutin were found in none of these samples. The result obtained in this study also represents the effective role of plant growth site based on their different ecological and climatic characteristics in the accumulation of the secondary metabolites.

**Keywords:** *Matricaria chamomilla*, HPLC, Apigenin, Luteolin, Quercetin

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## Flavonoids from Wild Mint with Therapeutic Enzymes Inhibitory Activities and Molecular Docking Analysis.

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Mints (*Mentha* species) are widely used as food, medicine, spice and flavouring agents (1). This genus contains 56 accepted taxa including 42 species distributed worldwide especially in temperate and sub-temperate regions. *Mentha* represents in Iran by 7 species. *Mentha* species are of big economic value today and largely consumed in pharmaceutical, beverage, confectionary, culinary, perfume, food, cosmetic, and tobacco industries. In this work, 3 flavonoid compounds were isolated and identified from wild mint (*Mentha longifolia*) using 1D and 2D NMR. Their enzyme inhibitory properties were evaluated against 7 therapeutic target enzymes including amylase, glucosidase, tyrosinase, acetylcholinesterase, butyrylcholinesterase, lipase, and elastase and IC<sub>50</sub> values were calculated. Molecular docking analysis were also performed to identifying of possible interactions between flavonoids and targeted enzymes. Results showed that *Mentha longifolia* and its flavonoid ingredients have moderate to high potential for possible uses in management of some popular diseases such diabetes mellitus, Alzheimer's disease, and obesity.

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## Evaluation of Phenolic Compounds and Antioxidant Activities of Some Chamomile Populations

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Polyphenolic compounds, natural antioxidants are found in most plant part such as leaf, stem, fruit, root, and seed. Chamomile is one of the plants which has good antioxidant activity. The plant's antioxidant properties are contributed to the presence of phenolic compounds. In this experiment, Flowers of thirteen populations were gathered in March and April 2017. The Populations included the different cities of Ilam and Khuzestan provinces, such as Darehshahr, Abdanan, Ilam, Ivan, Mourmouri, Ramin, Izeh, Baghmalek, Masjid Soleiman, Gotvand, Andimeshk, Salehshahre, and Dezful. Flower samples were dried at shaded room temperature. Metanolic extraction was prepared using ultrasonic. The amount of phenolic compounds, including total flavonoid, total phenol, flavone, and flavonol were measured by spectrophotometric method. The antioxidant capacity of the samples was measured using two DPPH and OARC methods by the plate reader. The result showed that chamomile in different habitats differs significantly in terms of the secondary compounds. The highest totalphenolic content, total flavonoid, flavonoid and flavonol were observed in Darehshahr sample with the amount of 30/63, 20/48, 5/31 mg to g material, respectively. Gotvand, Ramin, Izeh, Baghmalek, and Moormoori populations had the highest of flavonoid with the amount of 28/40, 25/35, 24/84 and 23/80, respectively. Ivan, Salehshahr and Masjed Soleiman populations had the lowest amount of flavonoid with the amount of 7/32, 7/80, 8/91 mg to g of dry material, respectively. Consequently, Izeh, Ivan, Gotvand, and Ramin showed significant antioxidant capacity in compare with the rest populations. The result of this study, like other studies, have shown that the plants with higher phenolic compounds reveal higher anti-radical activity. In summary, it is concluded that antioxidant capacity is contributed to all secondary metabolites.

**Keywords:** Secondary metabolites, Antioxidant capacity, DPPH, ORAC, Flavonoid

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## Design, Formulation and Characterization of a Nanocarrier System for *Thymus Daenensis* Essential Oil and Investigation of Antibacterial Activity Against Upper Respiratory Tract Infectious Bacteria.

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*Thymus daenensis* has been used in traditional medicine to treat upper respiratory tract infections (URTIs) since ancient time [1]. The essential oil from this plant is rich in thymol, which has been shown to be an effective antimicrobial agent. However, the application of thymol in commercial products is limited by its low water-solubility and high vapor pressure. The objective of this study was to produce stable nanoemulsions of *Thymus daenensis* oil using a combination of surfactants and co-surfactants to prevent Ostwald ripening and phase separation. The antibacterial activity of bulk and emulsified essential oil against URTIs pathogenic bacteria including Gram-negative (*Haemophilus influenzae*, *Pseudomonas aeruginosa*) and Gram-positive (*Streptococcus pneumoniae*) were investigated in the liquid and vapor phase. The optimum formulation contained 2% Tween 80 (surfactant) and 0.1% lecithin (co-surfactant) and had a mean droplet diameter of about 131 nm. In the liquid phase, the optimized nanoemulsion exhibited good antibacterial activity against *Streptococcus pneumoniae*, i.e a MIC value of 0.0039 mg/ml. In the vapor phase, the MIC values against *Streptococcus pneumoniae* were similar (<7.35 µL/L) for both bulk and emulsified essential oil. However, there was no antibacterial activity in the vapor phase against *Haemophilus influenzae* and *Pseudomonas aeruginosa*. An analysis of the thymol concentration in the head-space indicated that the nanoemulsion retarded the release of thymol into the vapor phase. These findings highlight the potential applications of nanoemulsion-based delivery systems containing essential oils for treating URTIs.

**Keywords:** Upper respiratory tract infections, Essential oil, Nanoemulsions

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### Hormozgan Chemotypes of *Zataria multiflora*: Rich Source of Carvacrol.

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The first step in achieving breeding goals is to be aware of the diversity of wild populations and the selection of superior individuals in terms of phytochemical characteristics. Changes in climatic conditions in different plant habitats, create a spectrum of chemotypes. The exploitation of the superior chemotypes has been recommended in the breeding programs. *Zataria Multiflora* with the common Persian name of “Avishan-Shirazi” is an aromatic, woody and perennial herb belonging to the Lamiaceae family 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 (antiflatulence and intestine-soothing). The essential oil of the plant is rich in monoterpenes such as carvacrol (0.7 - 50.6%) and thymol (6-54.9%) [3]. In this study, the aerial flowering parts of five *Z. multiflora* populations were collected from Bastak habitat (26° 58' N, 53° 56' E at an altitude of 985 m) of Hormozgan province. Air dried aerial parts of samples were then subjected to the Clevenger apparatus for the essential oil isolation. Essential oils were analysed by GC-FID and GC-MS. Essential oil content (% w/w) ranged from 4.2 to 6.4%. Totally, fourteen chemical components were identified in the oils. Carvacrol (0.4 to 95.2%) was the dominant fraction of the oil studied.  $\gamma$ -Terpinene (1.2 - 3%), thymol (0.1 - 4.2%) and *p*-cymene (1- 1.9%), were the other oil components. Phenolic essential oils are attractive for pharmaceutical, food and cosmetic industries. Our findings revealed that *Z. multiflora* chemotype's studied are rich in carvacrol which can be considered for further exploitation in domestication and breeding programs.

**Keywords:** Carvacrol, Chemotypes, *Zataria multiflora*, Lamiaceae, Natural habitat

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### Essential Oil Composition and Antioxidant Properties of *Prangos Gaubae*.

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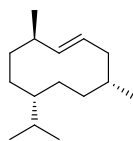
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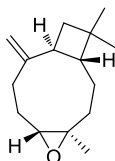
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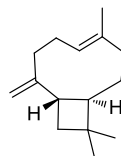
The genus *Prangos* L. belonging to the Apioideae subfamily of the Apiaceae family contains around 45 herbaceous hemicryptophyte species worldwide. The members of the genus are mostly distributed in the southwest and central Asia. *Prangos* represents by 14 species in Iran, of which 5 species including *P. gaubae* (Bornm.) Herrnst. & Heyn are endemic to the country. At the present work, chemical composition of essential oil and antioxidant properties of *Prangos gaubae* were evaluated for the first time. EO analysis showed the presence of germacrene D (26.7%), caryophyllene oxide (14.3%), (*E*)-caryophyllene (13.8%), and spathulenol (11.3%) as the major volatile components. Several antioxidant assays such as antiradical, metal chelating, and reducing power were carried out and promising activities were observed. Results indicated that *P. gaubae* has potential for possible uses in food, cosmetic, and pharmaceutical industries due to its valuable phytoconstituents and biological activities.



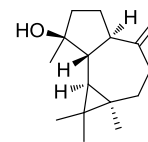
Germacrene D



Caryophyllene oxide



(E)-Caryophyllene



Spathulenol

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**Improving Fig Shelf Life by Using Essential Oils of *Thymus vulgaris*.**

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Fig is drought resistant tree and has high nutritional value. Unfortunately, fig has a very short shelf life. Therefore improving its quality and quantity is very important. In recent years, the use of essential oil of medicinal plants is very impressive. Thyme is a plant that has many medicinal properties, including its impact on increasing the shelf living. In this study, the effect of *Thymus vulgaris* on qualitative and quantitative characteristics of figs fruit was studied. This experiment was carried out during the years 2015 and 2016 as a factorial based on a randomized complete design with three replications in a commercial garden located in Tarom, Zanjan. In this experiment, four concentrations 0, 100, 200 and 500 ppm of *Thymus vulgaris* essential oil, at the first hour after harvest fig fruit by using disk diffusion method were used. 7 day after of storage the soluble solids, acidity, fruit set, vitamin C content, tissue firmness, calcium content of fruit tissue, fruit length, fruit width, physiological loss in weight and fruit weight were measured. The results showed that *Thymus vulgaris* essential oil in our sample improved qualitative and shelf life traits. The highest amount of TSS, TA and Vitamin C, observed in 500 ppm concentration of *Thymus vulgaris* essential oil treatment. *Thymus vulgaris* essential oil increased the firmness (1.7 Newton) of the fruit tissue, while there was no significant difference between differnt construction. with increasing concentration of *Thymus vulgaris* essential oil, The activity of catalase enzyme increased. *Thymus vulgaris* essential oil treatment reduced physiological loss in weight.

**Keywords:** Fig, Shelf life, *Thymus vulgaris*, Enzymatic activity, Physiological loss in weight

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**Contact Toxicity of Botanical Insecticide, Tond Eksir, on the Berry Whitefly, *Aleuroclava jasmine*.**

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The berry Whitefly, *Aleuroclava jasmini* is the most important pest of berry trees and causes severe damages on these trees every year. Chemical control is the major method to manage the pest. Because of deleterious effects of the chemical compounds, the use of plant based pesticides would be a safe and proper method for the pest control. In this study, the contact toxicity of a new botanical pesticide, named Tond eksir, was evaluated on egg, pupa and adults. A preliminary experiment was conducted to find concentrations to cause 20 and 80 percent mortality. The bioassay was designed to determine LC<sub>50</sub> values of 24 h post treatments. LC<sub>50</sub> was estimated to be 1.015, 8.626 and 2.367 ppm on egg, pupa and adults, respectively. Findings of this study, indicated the possibility of practical use of Tond eksir in management of berry Whitefly beetle in urban landscape.

**Keywords:** Tond eksir, Berry whitefly

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**Effect of Dietary Supplementation of Dwarf Elder (*Sambucus ebulus*) on the Some Immune Response of Rainbow Trout (*Oncorhynchus mykiss*).**

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The use of antibiotics for controlling aquatic animal diseases is widely criticized for its negative impact, including selection of antibiotic resistant bacterial strains, immunosuppression, environmental pollution and accumulation of chemical residues in fish tissues. Recently, there has been increased interest in the possibility of using medicinal herbs as immunostimulants, capable of enhancing immune responses and disease resistance of cultured fish. Therefore, we investigated the effect of dwarf elder (*Sambucus ebulus*) as a herbal medicine plant on some immunological parametres of rainbow trout, *Oncorhynchus mykiss*. Groups of 30 juvenile trout (51.2 g ± 1.6) were randomly allocated into 4 different treatments with three replicates each. The control group was fed a basal diet, while the other three groups were fed diets supplemented with 2.5%, 5% and 10% of dwarf elder (leaf powder). The fish were fed to apparent satiation for a period of 4 weeks. At the end of experiment, respiratory burst activity, total immunoglobulin and serum lysozyme activity were determined in fish blood. After 4 weeks, the fish treated with dwarf elder exhibited significantly increase in respiratory burst activity and total immunoglobulin levels compared to the control (P<0.05) and between treatment groups. 5% dwarf elder group shown the highest respiratory burst activity (P<0.05). Supplementing 5% and 10% dwarf elder increased the serum lysozyme activity compared to the control (P<0.05). In conclusion, based on the current findings together with the low cost and the immunostimulative effect of dwarf elder it is recommended to be used in fish feed to minimize the mortalities caused by some pathogens and antibiotics consumption.

**Keywords:** Respiratory burst activity, *Sambucus ebulus*, Rainbow Trout, Lysozyme activity

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**Effect of Berberis Vulgaris Extract on Experimental Leishmaniasis Ulcers.**

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Cutaneous leishmaniasis is one of the most important parasitic diseases that is most common in tropical and subtropical parts of the world. Currently, the treatment of cutaneous leishmaniasis is based on the use of 5-strength compounds of antimony, glucantime. Since treatment with these drugs has limitations and side effects, this study was conducted to investigate the presence of Berberis in the treatment of leishmaniasis. Materials and Methods: 80 male mice with the same sex and weight were subjected to subcutaneous injection of 0.1 ml of live and active leishmaniasis Promastigote at the base of the tail. The test was as follows: Control group without using barberry extract and the other two groups used barberry extract of 20% and 40%, and in the last group received placebo treatment. The test was performed for 35 days and each week the wound diameter and weight of the rats were evaluated. The test was as follows: The control group without Berberis extract and the other two groups of Berberis extract were used for 20% and 40%, and in the last group received placebo. The test was performed for 35 days and each week the wound diameter and weight of the rats were evaluated. Findings and Conclusion: In rats treated with extract 20% decreased wound diameter and weight gain ( $p < 0.001$ ). At 40% concentration, wound healing was less than the concentration of 20% ( $p < 0.001$ ). And in the other two groups, control and treatment with placebo increased wound diameter and weight loss ( $p < 0.05$ ). By observing the results, the concentration of 20% Berberis herbal extracts is more effective than other groups and other concentrations.

**Key words:** *Berberis vulgaris*, Lishmaniasis

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**The Effect of Abscisic Acid on Increasing Biomass in Adventitious Roots of *Hypericum perforatum* L.**

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The adventitious roots of *hypericum perforatum* L. is a critical source of secondary metabolites, which is important in producing pharmaceutical productions. This article has aim to examine the effect of abscisic acid on increasing biomass in adventitious roots of *hypericum perforatum* L. The abscisic acid were added in various concentrations in 250 mL flasks with 70 mL 1/2 MS medium supplemented with B5 vitamin and 1 mg/L IBA. The cultures were then initiated by inoculation with adventitious roots at a density of 6 g/L. Experiment conducted using a completely randomized design with three replications. The grown roots were harvested after 28 days of culture and then fresh weight, dry weight, total phenolic and flavonoid compounds were measured. Additionally, the quality of adventitious roots has been monitored during that time. The results of analysis of variance has shown that the amount of biomass significantly increased (1.7 fold higher than that of control) by reducing of abscisic acid concentration. Moreover, the decrease in abscisic acid concentration has resulted increase in phenolic and flavonoid components 1.1 and 1.5 respectively compared to the control group. It also prevented from the change of root colors to brown.

**Keywords:** *Hypericum perforatum* L., Adventitious roots, Biomass, Abscisic acid

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## Neuroprotective Effect and Phytochemical Assessment of *Pedaliium murex* Linn. Leaf Extract in Lipopolysaccharide-Induced Neurodegenerative Model in Rats.

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The herb, *Pedaliium murex* Linn. neuroprotective effect in Lipopolysaccharide (LPS)-induced neurodegenerative model is controversial, and its neuropharmacological profile has not been examined previously. To overcome the burden, we planned to develop new therapeutic agents from nature. *Pedaliium murex* Linn leaves were extracted with n-hexane, chloroform, ethyl acetate, 90%v/v of ethanol in Soxhlet apparatus. The extracts were subjected to qualitative phytochemical screening, *in vitro* free radical scavenging activities. Two new compounds were isolated from 90%v/v of ethanol extract of *Pedaliium murex* Linn (EPPM). Sprague Dawley rats (48), 100-150g were randomly allotted into six groups with 6 animals in each group. Group I: Control group; Group II: LPS (1mg/kg); Group III: EPPM 100 mg/kg for 30 days+LPS (1mg/kg); Group IV: EPPM 200 mg/kg for 30 days + LPS (1mg/kg); Group V: EPPM 400 mg/kg for 30 days+LPS (1mg/kg); Group VI: Dexamethasone (0.5 mg/kg) for 30 days + LPS (1 mg/kg). To assess the neuroprotective effect of EPPM, general behaviours and brain neurotransmitters, enzymatic and non-enzymatic antioxidant levels were studied. Two compound structures (PM-I, PM-II) were elucidated and confirmed by spectral studies. The results suggested the spectral data of PM-I was consistent to 4', 5, 7- trihydroxy flavone, also known as apigenin and PM-II spectral data was consistent to kaempferol (3,5,7-Trihydroxy-2-(4-hydroxyphenyl)-4H-chromen-4-one). The suppression general behaviour and the perturbations in the levels of brain neurotransmitter, enzymatic and non-enzymatic antioxidant systems in LPS-treated rats significantly antagonized by pre-treatment with EPPM at different dose levels. We concluded, a neuro protective role of EPPM, reversing the LPS-induced neurodegeneration in rats due to the presence of phytomolecules in this plant.

**Keywords:** Neurodegenerative diseases, Phytochemicals, Endotoxemia, Free radicals

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## The Effect of Elicitor Chitosan on Secondary Metabolites of Fennel (*Foeniculum vulgare* M).

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Fennel (*Foeniculum vulgare* M) is a herbaceous, fragrant and stable herb of Chaterian family. This medicinal herb has a secondary metabolite that is widely used in the food industry. Nowadays in the pharmaceutical industry, the active ingredients of fennel are used to treat coughing, pain and substance that facilitates digestion. In this study, the effect of elicitor chitosan on the amount of flavonol, flavonoids and anthocyanins of the fennel, which was obtained through tissue culture in ms1/2 medium, was evaluated. The results showed that flavonol, flavonoid and anthocyanin traits were significant at 1 percent probability level, indicating the effect of both environmental factors and explant on the studied traits. Generally, in leaf and root explant, the highest amount of flavonol was observed in the control and flavonoid media in a concentration of 10 mg/L chitosans. In the leaf explant, the highest concentration of anthocyanin was observed in a concentration of 10 mg/L and root explant in a medium containing 20 mg/L chitosan.

**Keywords:** Fennel, Elicitor, Chitosan



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## Evaluation of the Total Phenolics and Antioxidant Activity of the Root Extracts of Six Accessions of Iranian Licorice

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Licorice (*Glycyrrhiz aglabra*) roots and rhizomes recognized throughout the world as a popular medicinal herb for health, contains a wide array of medicinally active components. In this study, six accessions collected from different parts in Chaharmahal and Bakhtiari province of Iran (Sorshejan, Farsan, Ardal, Kiar Amir Abad, Broujen and Lordegan) due to some biochemical properties, such as total phenolic, Tannin, Flavonoid, and antioxidant activity. Kiar locality showed the highest content of total phenolic compounds (8.59±0.034) while the lowest was found in Ardal (4.02± 0.052). Tannin content were highest in roots gathered from Lordegan (0.697± 0.018). Farsan showed the highest content of flavonoid in three at three wavelengths: 270, 300 and 330 nm (respectively, 0.916±0.023, 3.542±0.092 and 1.945±0.01). Also, Kiar showed the highest content of antioxidant activity (70.40± 0.146). The results showed a correlation between tannins and Latitude and longitude of locality. Antioxidant activity content was correlated with soil texture. Based on the results, it seems that the pattern of phenolic contents differs based on climatic conditions. Between studied parameters, and Latitude and longitude of locality and soil factors are the most correlated climatic parameters affect the content of some phytochemical parameters in roots of *G. glabra* (Data didn't show). Moreover, there were differences in the occurrence and concentration of the phenolic compound profiles of the six accessions, but Kiar locality showed higher contents of Phenol and, Flavonoid, and antioxidant activity. Thus, it can be concluded that Kiar locality is a rich source of polyphenols, Flavonoid, and antioxidants. Generally, interaction between the climatic conditions and type of location affected the biochemical compounds, thus location choice is the most important factor before planting.

**Keywords:** Phenol, Tannin, Flavonoids, DPPH, *Glycyrrhiza glabra*

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## The Study of Fatty Acids In *Citrus Auratium* Seeds Oil.

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*Citrus auratium* is a commercial variety of citrus varieties cultivated in North part of Iran. *Citrus auratium* seeds were evaluated in terms of oil qualities such as peroxide value, acidity index and fatty acids. The oil extracted from seeds by Soxhlet, the yield was 49.2%. The results showed that twenty fatty acids were detected in composition of the oil. Linolenic acid (32/77 %), Palmitic acid (25/03%) and oleic acid (24/18 %) were identified as the main fatty acids. The results of acidity index and peroxide value were 7.05, 40 respectively. The results showed that oil seeds from *Citrus auratium* can be used as a good source of human edible oil.

**Keywords:** *Citrus Auratium*, Fatty Acids, Waste, Oil Seeds

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## Study of the Ability of Daphnetin-8-β-Glucoside from *Daphne mucronata* to Induce Apoptosis Activity.

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In traditional medicine *Daphne mucronata* was well known for its ethnopharmacological importance and was employed for the treatment of breast tumors and skin diseases. According to previous studies the water-ethanol extract of this plant exhibits cytotoxic activity, especially on breast cancer cell lines. In this study, isolation of the chemical constituents of *D. mucronata* was carried out using bioassay-guided fractionation. Initially, cytotoxic activity of methanolic extract of the plant was examined on four different cell lines [MCF-7, Hela, K562, Hep G2] by MTT assay. The highest cytotoxic activity of the methanol extract was exerted on breast cancer cell line (MCF-7). The methanol extract was suspended in water and extracted successively with *n*-hexane, ethyl acetate, and *n*-butanol. Each extracts was tested against MCF-7 cells, and *n*-hexane extract showed the best activity with IC<sub>50</sub> value of 75.0 μg/mL. fractionation of the *n*-hexane extract by different chromatographic techniques led to the isolation of 14 compounds. Their structures were established by high-field NMR techniques (1H & 13C NMR, 1H-1H COSY, HMQC, HMBC). Among the isolated compounds, a coumarin, named Daphnetin-8-β-glucoside, was shown promising anticancer potency against MCF-7 with IC<sub>50</sub> value of 81.19 μg/mL. The apoptosis- inducing capability of Daphnetin-8-β-glucoside, against MCF-7 cell line was studied using Flow Cytometry, Western Blotting, and DNA Fragmentation techniques. Furthermore, imaging by an inverted light microscopy and laser scanning confocal microscopy was performed.

**Keywords:** *Daphne mucronata*, Flow Cytometry, DNA Fragmentation techniques



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## The Effect of Plant Growth Regulators on Shoot Regeneration and Production of Phenolic Compounds in *Perovskia Abrotanoides* Karel.

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*Perovskia abrotanoides* Karel. (Lamiaceae) is a medicinal plant which grows as wild populations in some areas of Iran [1]. Several pharmacological effects including antibacterial, anti-inflammatory, anti-cancer, antifungal, and rheumatoid pain relief and cytotoxic effects have been reported for this plant, which are mainly attributed to the presence of phenolic acids, in particular, rosmarinic acid and tanshinones. The purpose of the present study was to establish efficient shoot regeneration protocols for *P. abrotanoides* and optimizing and enhancement of phenolic compounds production in the regenerated shoots using some plant growth regulators. At first, mature seeds were harvested from plants in their natural habitat and after scarification with sandpaper and sterilization were cultured on free-hormone MS basal medium. Then, stem nodal explants from 40-day-old plants were cultured on MS medium supplemented with different concentrations of kinetin (KIN) (ranged 0.125 to 3.5 mg/L), 6-benzylaminopurine (BAP) (ranged 0.25 to 2.0 mg/L), 1-naphthaleneacetic acid (NAA) (0.1 and 0.5 mg/L) and indole-3-acetic acid (IAA) (ranged 0.25 to 2.0 mg/L) alone or in combination to induce shoots. Tissue culture experimental design was completely randomized with 7 replicates and 28 explants per treatment. After 30 days, growth indices, total contents of phenolic acids, phenolic compounds and flavonoids were measured in the regenerated shoots. The concentration of rosmarinic acid in the shoots was determined using HPLC method. The highest dry ( $0.03 \pm 0.003$  g) and fresh ( $0.20 \pm 0.015$  g) weights for the regenerated shoots were obtained on MS with 0.125 mg/L IAA. The highest contents for total phenol ( $57.12 \pm 1.70$  mg gallic acid/g DW) and phenolic acids ( $15.83 \pm 0.50$  mg rosmarinic acid/g DW) was determined on MS with 3.5 mg/L KIN + 0.25 mg/L IAA. Also, the maximum amounts for total flavonoid ( $9.13 \pm 0.50$  mg quercetin/g DW) and rosmarinic acid ( $8.37 \pm 0.71$  mg/g DW) in the regenerated shoots were reported on MS with 0.5 mg/L KIN + 0.125 mg/L IAA. Based on the results, significant increases were observed in the total phenolic (2.42-fold) and flavonoid (2.12-fold) contents, as well as the amounts of phenolic acids (2.48-fold), and rosmarinic acid (4.9-fold) in the regenerated shoots, as compared to the control plants. In conclusion, our findings showed that *in vitro* shoot culture is an efficient tool for improvement of medicinal metabolites production in *P. abrotanoides*.

**Keywords:** *Perovskia abrotanoides* Karel., Plant growth regulators, Phenolic compounds

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## The Study of *Hibiscus Sabdariffa* L. Calyces Extracts Using As Antimicrobial Agent in Beef Sausage.

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Effects of *Hibiscus Sabdariffa* L. Calyces extracts as natural alternative preservatives on microbial count, color and sensory characteristics of beef sausage were investigated during cold storage at 2°C for 14 days. Five treatments of sausages were prepared; Control, tert-Butylhydroquinone (TBHQ) added, 50,100,150 and 200mg/100g *Hibiscus Sabdariffa* L. calyces ethanol extract/sausage mixture for T1, T2, T3 and T4 respectively. The phenolic compounds contents 44.4 mg of gallic acid in 100 g of dried calyces (in ethanol-water 50/50%), and the antioxidant activity was 39.5 % 60.4 % by DPPH. *Hibiscus Sabdariffa* L. calyces extract inhibited the growth of all tested food borne bacteria strains, and decreased the total microbial count in sausage samples compared to control and TBHQ containing sausages. During cold storage, sausage samples with T3 Treatment showed; better color stability, control and TBHQ added samples. Sensory scores of sausage samples with T3 were as good as control and TBHQ added sausages. T3 samples scored better aroma, taste, tenderness and over-all acceptability compared to control and the TBHQ added sausage samples.

**Keywords:** *Hibiscus Sabdariffa* L., Calyces extract, Antimicrobial property, Sausage



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**Cadmium-Induced Oxidative Stress and Its Relationship with some Physiological Responses of Peppermint (*Mentha Piperita*. L).**

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Pollution of the biosphere with toxic levels of materials has accelerated dramatically since the beginning of the industrial revolution. Soil pollution by heavy metals including cadmium (Cd) is a global problem. Among several toxic heavy metals, more attention has been paid to Cd, due, mostly to the disturbance it may cause in plant growth and development. Cadmium-induced oxidative stress is associated with the activation of genes related to antioxidant enzymatic and non-enzymatic defence systems, related transcript levels, and cellular modification (1). Peppermint (*Mentha piperita* L.) is kind of medicinal plant. 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. In order to investigate the physiological responses of *Mentha piperita* plants to Cd-induced oxidative stress, a randomized complete block pot experiment with five replicates was conducted. Four levels of Cd (including 0, 2, 6 and 11 mg/kg) were applied to the soil before planting. Cd tolerance index, chlorophylls and carotenoids content, quantum efficiency of PSII, catalase (CAT) and ascorbic peroxidase (APX) activity were measured in 60-day treated plants. At the 2 mg/kg level of the CdCl<sub>2</sub> in the soil, no significant damage was observed and no changes in the antioxidative responses observed. At the 6 mg/kg level of CdCl<sub>2</sub> CAT and APX activities increased compared to control, however other traits did not change with this level of Cd compared to control. With increasing Cd level to 12 mg/kg CAT and APX activities decreased compared to 6 mg/kg level of CdCl<sub>2</sub>. Chlorophylls and carotenoids content did not show any changes with increasing Cd level to 12 mg/kg compared to control, however quantum efficiency of PSII and Cd tolerance index decreased significantly. Therefore it seems that the CAT and APX-dependent defensive strategy of peppermint is effective for soil Cd content to 6 mg/kg and with further increase in soil Cd content these enzymes did not prove to be effective in peppermint response to Cd.

**Keywords:** Catalase, Ascorbate peroxidase, PSII and Tolerance Index

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**Effect of Super Absorbent Polymer and Zeolite in Different Levels of Irrigation on Growth and Yield of Stevia.**

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Today, the use of new technologies and materials that have been introduced to improve the soil texture and increase the capacity of water storage has become very common. This research was conducted to investigate the effect of application of super absorbent polymer and zeolite in different irrigation levels on the growth and yield of stevia plant in a greenhouse of Mohaghegh Ardabili University in 2016. The experiment was carried out in a split plot design (split plot) based on a randomized complete block with four replications. In this research, four irrigation treatments as: irrigation after 35, 70, 105 and 140 mm evaporation from class A evaporation pan as the main factor. As a sub factor, zeolite, superabsorbent polymer, both of these two substances and the non-use of them (control) were used along with sand in pots. Stevia plants were fed during the experiment with Hoagland solution. The results showed that irrigation after 35 and 70 mm evaporation with combined application of polymer additive and zeolite had the best level of morphological and physiological traits such as yield and biomass, and the lowest level of these traits was obtained from irrigation after 140 mm evaporation and use of no soil additive. The highest amount of chlorophyll was obtained in irrigation after 70 mm evaporation and in irrigation after 140 mm evaporation resulted in the lowest chlorophyll index. There was no significant difference in the amount of stevicide between experimental treatments. Based on the results of this experiment, the use of super absorbent polymer and zeolite can be effective in reducing the stresses of the stevia plant in its greenhouse culture [1,2].

**Keywords:** Stevia, Zeolite, Super Absorbent Polymer, Irrigation

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## Assesing the Response of *Satureja Hotensis* and *Silybum Marianum* Seedling to Cd Stress

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Heavy metals are naturally present in the environment. cadmium (Cd) can be easily taken up by plant roots (3). At the same time, due to industrial, agricultural and municipal activities, cadmium accession to agricultural environment has increased, with its several potentially toxic consequences in soil, plant, animal and human system. Heavy metals such as Cd may cause the formation of reactive oxygen species (ROS), damage plant tissue membranes, as well as inhibit photosynthesis, carbon dioxide assimilation, and growth (1). Medicinal and aromatic plants are mainly grown for secondary products (essential oil) thus the contamination of the food chain with heavy metals is eliminated. Aromatic and medicinal plants also have a demonstrated ability to accumulate heavy metals (2). Therefore the purpose of this study was to investigate the effects of levels of cadmium concentrations on seed germination in savory (*Satureja hotensis*) and Milk thistle (*Silybum marianum*). Two studies were conducted in completely random design experiments with five replicates for each study. Randomly selected samples of fifty seeds from each species were exposed to test solutions of CdNo<sub>3</sub> at five concentrations (2, 5, 10, 15, and 20) and distilled water as a control. The seeds were sown on the Petri dishes with two-layered filter paper wetted with 10 ml of metal solutions. After the test solutions were added, the Petri dishes with seeds were randomly positioned in a controlled environmental chamber on a 24 h temperature cycle 24±1oC and 18±1oC (for 12 h each) for germination. Seed germination was measured every 24 h. Seeds were considered to have germinated at radical emergence of 1 mm. Shoot and root length, seedling weight, germination rate, germination percentage, vigour indices and the germination uniformity were measured. The results showed that the Cd levels used in this experiment did not significantly affect any of the traits measured in *Satureja hotensis*. In *Silybum marianum* Cd levels had significantly affected on all trait measured except germination uniformity and seedling dry weight. The root length in *Silybum marianum* decreased with Cd concentration. Germination percentage in *Silybum marianum*, at the 5 m/l level of Cd showed a significant decrease compared with the control level. Therefore, it could be concluded that among the medicinal plants used in this study, *Satureja hotensis* is by far the most tolerant, at least during its germination, to the Cd pollution.

**Key words:** Cadmium, Medicinal plant and Germination

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## Safety Indicators of Broiler Chickens under Conditions of In-Ovo Injection and Administration of Licorice and Colloidal Nano Silver in the Replacement of Antibiotics During Growth After Hatch

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The aim of the study was to analyze how application of per os licorice extract (LE) (*Glycyrrhiza glabra*) and colloidal nano silver (CNS) affect the safety Indicators of ross broiler chickens in both embryonic and growth period. In Embryonic period Eight hundred Fertilized commercial eggs were randomly assigned to one of 10 treatments with five replicates (20 eggs each replicate). This experiment was arranged based on a completely randomized design (CRD). First group was control (without injection), second group was control (0.1 cc injection of Sterilized distilled water) and groups from third to ten were included 0.1 cc injection both LE in three levels (0, 100 and 200 ppm) and CNS in three (0, 30 and 60 ppm), in form of alone and combination with each other. For Growing period after hatch, the best treatments in first step were choosed and transferred to this step. Treatments consisted of two control groups from first step and other group treated in diet with both LE in three levels (0, 1 and 2 gr/kg) and CNS in two levels (0 and 120 ppm) in form of alone or combination with each other and a group treated with antibiotic. Antibody response to Newcastle disease was significantly high in the group has been treated with 60 ppm CNS and 200 ppm LE (P<0.05). At the 42 days of age the highest antibody response belonged to 1gr/kg LE and 2gr/kg LE treatment (P<0.05) and antibiotic treatment had the lowest antibody response. These results consistented with the previous report Khaligh et al. Was observed positive effects on WBC count. The level of 60 ppm CNS and levels of 100 and 200 ppm LE combined with each other had much more affirmative effect on Lymphocytes percent than other treatment (P> 0.05) in agreement with Baseer et al. In the present study none of these organs (bursa, spleen, Thymus) were affected significantly (P> 0.05) by treatments. These results were consistent with those of the study by Sedghi et al. reported internal organs and related immune organelles such as burse and spleen weight accompany with breast and leg in herbal medicine (licorice and thyme) and enzyme supplemented diets were improved significantly than control diet(P<0.05). These findings indicated that licorice and colloidal nano silver singly or in combination with each other can improve safety Indicators of chickens.

**Keywords:** Safety Indicator, Broiler chickens, in-ovo injection, Licorice, Nano silver

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## Phytochemical Study of Essential Oil of *Thymus Vulgaris* and *Thymus Fallax* in the Region.

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Thyme is one of the genera of the mint family, located below the Puneiah family. This plant is disinfectant, Anti-spasm and anti-cough. Thyme essential oil also has many properties that one of its properties is anti-activity Oxidant. The aim of this study was to investigate the different compounds of Anatolia thyme and thyme in two different habitats of Mazandaran province and comparison Their compounds. In this study, essential oils of two species of thyme were harvested from different habitats and dried. Essential oil of the samples was extracted using clevenger Steam Distillation method and their combinations were analyzed using GC gas chromatography and gas chromatography connected to GC / MS mass spectrometer. The results of the analysis showed that the number of compounds in the anatic juice of 57% composition with a total of 52.97%, the major components of which include Carvacrol (38.58%), timol (12.49%), jumterpinene (5.33%), methyl isopropyl benzene (4.04%), 1 and 8 cineol (19.3%) and gardening thyme (48) with a total of 99.88%, the most important of which are thymol(39.6%), Simul (15.1%), jumterpinene (12.28%) and betamyrce (3.29%). Studies on the essential oils produced by the reproductive organs of the species in question led to the precise identification of the compounds as compared to previous studies.

**Keyword:** Phytochemistry, Essential oil, Thyme, Mazandaran

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## Assesing Radiation Absorption and Use Efficiency of Cumium and Fenugreek in Sole and Intercropping.

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Sunlight is the main source of energy in agroecosystems. Light is absorbed by leaves and this energy is stored during the process of photosynthesis in chemical bonds of organic compounds and finally converts to the plant biomass. Increasing agro-diversity is one of the best and most operational principles to optimize the sunlight utilization [1]. Intercrop yield is affected by solar radiation distribution in the intercropping canopy and intercrop RUE depends not only on crop canopy geometry but also on the intercropping arrangement. So, farmers must choose appropriate cultivars to best synchronies the crops [2]. In order to study the seed yield and radiation use efficiency (RUE) of cumin (*Cuminum cyminum* L.)-fenugreek (*Trigonella foenum-graecum* L.) intercropping, an experiment was conducted as a split-plot arrangement based on completely randomized block design with three replications at experimental filed of Ferdowsi University of Mashhad, Iran. The experimental treatments were planting dates (5 November, 5 December and 5 March) assigned to main plots and planting pattern in three levels (cumin and fenugreek sole cropping and cumin/fenugreek intercropping). LAI, dry matter and yields of the plants were measured during the growing season. The results showed that seed yields of cumin and fenugreek were significantly decreased by delaying in planting date. Economical yields of both crops in sole cropping were higher than intercropping system due to higher plant density. LAI and intercepted PAR in intercropping system were higher than sole cropping, and the traits were improved by sooner planting. In all the planting dates, LER<sub>PAR</sub> was greater than one, which represents the positive role of intercropping on radiation intercept compared to sole cropping. In general, the results showed that RUE in intercropping system was higher than sole cropping of the two species. Also, fenugreek had higher RUE in comparison with cumin in all the experimental treatments. It seems that the intercropping system can be considered an appropriate approach for efficient use of resources.

**Keywords:** Light absorption, PAR, LER, Partial interception

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## Biological Synthesis of Silver Nanoparticle Using *Dracocephalum Kotschy* and Its Antibacterial Effects on Nosocomial Pathogens

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Hospital infections are prevalent today in health centers. These infections are associated with an increase in the duration of hospitalization and the cost of treatment and the antibiotic resistance of bacteria responsible for infection. Despite the large number of antibiotics, hospital infections are uncontrollable. The high and inadequate use of antibiotics has increased the number of hospital infections. Nowadays nanotechnology is also beneficial in the field of nano-antibiotics, by the manipulation of size and scale. Nanoparticles synthesis done from chemical, physical and biological pathways. In green synthesis of nanoparticles, are used living organisms. One nanoparticle that has been considered for medical and therapeutic purposes for a long time, is silver nanoparticle that has antimicrobial properties. In this study, Green Synthesis of silver nanoparticles was performance by ethanolic extract of *Dracocephalum kotschy*. Antibacterial assay of nanoparticles was performed on five strains of *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella* and *Neisseria*, using two methods of disk diffusion test and Minimum inhibitory concentration (MIC). The average size of nanoparticles to be 5-25 nm. The diameter size of the silver nanoparticles was confirmed by XRD and TEM and SEM image analyses. Ethanolic extracts of plant were potentially effective with variable efficiency against the tested in all bacterial strains at concentration of 15/6 $\mu$ g/ml with MIC's ranged from 15/6 to 250  $\mu$ g/ml and MBC of 62/5 and 500  $\mu$ g/ml. The results showed that the silver nanoparticles synthesized by *Dracocephalum kotschy* have an appropriate antibacterial potential against hospital pathogens and can be used as nano achievements against infectious diseases.

**Keywords:** Hospital infections, *Dracocephalum kotschy*, MIC, MBC, Disk diffusion

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## Evaluation of Phytochemical and Fatty Acids Content and Composition in Iranian Borage (*Echium amoenum*) in Different Habitats of Iran.

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Iranian borage (*Echium amoenum* Fich & Mey), is one of the most important medicinal plants in north of Iran. Its dry petals are used in Iranian Traditional Medicine. This paper was about is presenting the analysis of phytochemicals and seed oils of *Echium amoenum* in different habitats and populations of Iran. The results showed that the oil content of seeds was 36% and 11 types of fatty acids which were identified and quantified by gas chromatography (GC). The major fatty acids were  $\alpha$ -linolenic acid (39.99%), linoleic acid (20.86%), linolenic acid (20%) and oleic acid (15.36%). The height was observed to influence the amount of phenols, tannins, flavonoids and anthocyanins increased with height. So, the highest rate of these compounds were found at an altitude of 2125 meters in Ciposht population. Peroxide number in the sample was 1.28, which indicates the suitable situation of for extraction, storage and oil quality.

**Keywords:** Accession, *Echium*, Phytochemical, Oil components, Iranian borage

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## Effects of Potabarvar Biofertilizer on some Physiological and Growth Characteristics of Fenugreek (*Trigonella foenum-graecum*).

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Nowadays, the use of soil-born microorganisms as biological fertilizers is considered to be a natural and most desirable solution to maintain sustainability of agricultural soil system. Fenugreek (*Trigonella foenum-graecum* L.) an annual legume, is extensively cultivated in most regions of the world for its medicinal value. The present investigation was undertaken to evaluate the effect of potabarvar biofertilizer on growth characteristics of fenugreek under field conditions. The experiment was conducted as randomized complete block design with three replications at the Agricultural Research Station, University of Birjand during growing season of 2016. Treatments were 2 levels of bio-fertilizers Potabarvar 2, (0 and 5Kg.ha<sup>-1</sup>). Results showed that the highest fresh weight (0.13g.m<sup>-2</sup>) and dry leaf (0.028g.m<sup>-2</sup>) were obtained in plants treated with 5kg.ha<sup>-1</sup> of biopotass, while the lowest values was recorded in the control. Also the highest biological yield (88 kg.m<sup>-2</sup>) observed in plants treat with 5kg.h<sup>-1</sup>. As a result potash bio-fertilizer had considerable effect on quantity and quality of fenugreek plant.

**Keywords:** Fertilizer, Vegetative growth, Fenugreek

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**Effect of Foliar Application iron Sulfate on Morphological Traits of Fenugreek (*Trigonella foenum-graecum* L.).**

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Foliar spraying of trace element is a useful method, especially in cases which the root doesn't have the ability to absorb the essential nutrients needs from the soil [1]. Fenugreek (*Trigonella foenum graecum* L.), an annual legume, is extensively cultivated in most regions of the world for its medicinal value. The effects of application of iron sulfate on some quantitative and qualitative characteristics of fenugreek (*Trigonella foenum-graecum* L.) were evaluated under field conditions. Treatments were two levels iron sulfate (0 and 1.5 in thousands). This experiment was carried out based on a randomized completely block design with three replications in research farm of University of Birjand, Iran, during cropping year 2016-2017. Results indicated that there was statistically significant difference between control and iron sulfate. In addition, results showed that spraying of iron sulfate significantly affected plant height, fresh weight, pods weight, grain number. Chibba et al., (2007) showed that the iron foliar application increased biological yield, plant height and number of stem in fenugreek. Thus, results showed that the use of iron sulfate could improve the morphological characteristics of fenugreek.

**Keywords:** Fenugreek, Reproductive growth, Micro elements, Spraying

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**Effects of Humic Acid on Physiological and Growth Characteristics of Fenugreek *Trigonella foenum-graecum***

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Humic acid is an eco-friendly fertilizer that improves the physical, chemical and biological properties of soil. This nutritional source has hormonal compounds and exerts a positive effect on elements absorption, quality and yield of plants. The effects of applications of humic acid on some physiological and growth characteristics of fenugreek (*Trigonella foenum-graecum*) were evaluated under field conditions. Treatments were of 3 levels of humic acid (0, 5, 10 Kg.ha<sup>-1</sup>) The experiment was designed in randomized block design with three replications at the Research station of Faculty of Agriculture University of Birjand during growing season of 2016. Results showed that of humic acid significant effected on vegetative traits (height, fresh and dry weight of the plant) and reproductive traits (biological yield). The highest height, fresh and dry weight of the plant was obtained in plants treated with 10 kg.ha<sup>-1</sup>humic acid. Also the highest biological yield observed in 10 kg.ha<sup>-1</sup>humic acid. Ayas and gulser, 2005 reported that humic acid by increasing the nitrogen content of spinach (*Spinacia oleracea* L.) increased growth in height and will be followed by a biological yield. Thus, results showed that humic acid had strong impact on some physiological and growth characteristics of Fenugreek.

**Keywords:** Organic fertilizers, Vegetative growth, Reproductive development

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**The Study of Regeneration in a Plant Medicine *Eryngium Cuacasicum*.**

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*Eryngium* is one medicine species plant belongs to Apiaceae family. This plant is one of the valuable medicine species in North of Iran that is used mostly in food and drug medicine. The medicinal and therapeutic properties of *Eryngium cuacasicum* is include: stimulative, tonic, appetite, diuretic, anti-inflammatory, anti-infectious in the treatment of anemia, gastrointestinal and kidney infections, for local people have great important. Regeneration through tissue culture is one of the most effective methods for the preservation and propagation of plants. In the present study regeneration *in vitro* conditions were investigated in leaf and petiole explants of *Eryngium cuacasicum*. Explants of this species were placed on MS and MS1/2 medium containing different doses of BAP and NAA plant growth regulator. Results showed that the petiole is suitable for callus induction more than leaf explant. The most effective culture medium regeneration was BAP + NAA (1:0.1 ml/l) and BAP(1).

**Keywords:** Micropropagation, Regeneration, *Eryngium cuacasicum*

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**Chemical Composition of *Centaurea aucheri* (Dc.) Essential Oil.**

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*Centaurea aucheri* is a kind of wheat flower. This Species distributed in West, North-West and Center in Iran. The aim of this study is to determine chemical composition in essential oils of *C. aucheri* for food, cosmetics-health industry and medicinal uses. The plant parts of *C. aucheri* were collected at flowering stage from Uromieh. Stem plus the leaf and inflorescence of this plant dried in laboratory and crush to particles. The essential oils were obtain by hydrodistillation and were analyzed by GC and GC/MS. The yields of essential oils of stem plus the leaf and inflorescence (w/w dried weight) were 0.19% and 0.06% respectively. The color of essential oils were yellow. The major constituents of stem plus the leaf and inflorescence essential oils were spathulenol (25.8% and 8.2%), caryophyllene oxide (20.8% and 23.8%) and eudesma-4(15)-7-dien-1-β-ol (22.4 and 1.6%) respectively. hexadecanoic acid (37.4%) was found only in inflorescence oil.

**Keyword:** *Centaurea aucheri*, Essential oils, Asteraceae

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**Germination and Initial Growth of some *Pimpinella* Species in Iran.**

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*Pimpinella* is belong to the umbellifera family and there are 150 species of this genus in the world, that are distributed in Europe, Asia and Africa. Sixteen *Pimpinella* species was reported in Europe and there are 22 species of this genus in Iran, which are often annual, seven species of them, are native [2]. Number of *Pimpinella* species is the valuable medicinal plants which can use in pharmaceuticals and cosmetics Industries. In order to study of genetic variation for seed germination and initial growth among 11 species and accessions of *Pimpinella*, a completely randomized design with four replications was conducted. Seeds of *P. aurea*, *P. barbata*, *P. dichotoma*, *P. eriocarpa*, *P. tragiun* were collected from different habitats of the country. Measured characteristics were: germination percentage, radicle and plumule length of seedlings, mean germination time, germination rate, seedling dry weight, seed vigor index. The results showed significant differences between species for germination percentage mean germination time, germination rate and seed vigor index. The results displayed that highest germination percentage and seed vigor index observed at *P. aurea* belongs to Esfahan, *P. barbata* belongs to ilam, *P. eriocarpa* belongs to Dizin and *P. tragiun* belongs to West Azerbaijan. According to results germination rate was superior in *P. tragiun* from zanzan and *P. barbata* from ilam.

**Key words:** *Pimpinella*, Seed vigor index, Germination, Locality

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## Chemical Composition Evaluation of *Fumaria* L. Distillates and Essential Oils.

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Herbal plant distillates and their essential oils are widely used as folk medicine in traditional therapies in Iran. *Fumaria* is a well-known herb which has been used for its medicinal properties. Some of the conventional properties of Fumariaceae family are antihypertensive, diuretic, liver protection, purgative, treatment of gastrointestinal disorders and abdominal cramps. The genus *Fumaria* L. comprises 60 species, but only eight species reported in Iran. *Fumaria Parviflora*, *Fumaria Vaillantii*, *Fumaria officinalis*, *Fumaria indica*, *Fumaria asepala*, *Fumaria densiflora* and *Fumaria schleicheri* are the species distributed in different habitats of Iran. In this study, on view to evaluate the Shiraz herbal market, the constituents of *Fumaria* distillate and essential oil were compared to the compounds of the other *Fumaria* distillate sample prepared from Shiraz market. The *Fumaria* distillate and its essential oil were prepared using hydro distillation method and their constituents were investigated by gas chromatography/mass spectrometry (GC/MS). The most abundant components of the *Fumaria* distillate samples were different from each other; n-Nonane (3.8), 1,8-Cineol (0.5), Piperitone (9.6), Thymol (27.7), Carvacrol (11.9) and Piperitenone (32.0) were the most abundant components in the distillate sample prepared using hydrodistillation method and n-Nonane (9.5), Thymol (1.8), Carvacrol (1.1),  $\alpha$ -Bisabolone oxide A (26.1) and  $\alpha$ -Bisabolol oxide A (19.1) were the most ones in the market distillate sample. Also the differences of the result with literature confirm the importance of the accurate identification of the plant that is used for preparing of *Fumaria* distillate at Shiraz market. Also the different distribution of the effective compounds at *Fumaria* distillate and its essential oil were investigated. The results provided a scientific viewpoint into the different distribution of the effective compounds at the water and oily phase.

**Keywords:** *Fumaria* L., Herbal distillates, Essential oils

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## Phytochemical Evaluation of *Peucedanum chenur* essential oil and Extracts.

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The genus *Peucedanum* (Apiaceae) comprising more than 120 species is widely distributed in Europe, Asia and Africa. The ethnopharmacological history of this genus indicated that aerial parts of several *Peucedanum* species have been used in folk medicine for treatment of various conditions, such as cough, pain, asthma and etc. Also in the literature, *Peucedanum* species have a reputation in the treatment of various diseases such as inflammations, cardiovascular disease, microbial infection and etc. In this project we studied on essential oil composition and phytochemical screening of extract the *P. chenur*. The aerial parts of *P. chenur* growing wild in Kurdistan, Iran was subjected to hydrodistillation using a Clevenger to produce light yellow oils. The volatile constituents in the essential oil of *P. chenur* were investigated by GC/Mass. The dried aerial parts of *P. chenur* was macerated successively in chloroform and methanol for 3 days at room temperature and the extract was concentrated in Rotary to give a green extract. The preliminary phytochemical analysis of the extracts carried out using standard procedures to identify the various constituents. The qualitative and quantitative phytochemical analysis of essential oil was performed and the major components of it were  $\alpha$ -pinene and limonene and  $\alpha$ - Phellandrene. The chloroform and methanol extract of *P. chenur* afforded three major grope components as tannins, steroids and alkaloids. According to the dimensions of the compounds of *Peucedanum* genus and their biological effects, the study on *P. chenur* has important effect on improvement of medicinal plant and pharmacological research.

**Keywords:** *Peucedanum chenur*, Essential oil, Extract, Steroid

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**Effect of Plant Growth Regulators on Flowering Behaviour of *Cucurbita pepo* var. *styriaca*.**

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Medicinal pumpkin (*Cucurbita pepo* var. *styriaca*) is a medicinal species of Cucurbitaceae family, which is well known for several healing properties. An experiment based on randomized complete block design with three replications was conducted to evaluate the effect of three plant growth regulators on flowering characteristics of medicinal pumpkin in Research Station of Department of Horticultural Science and Landscape, University of Tehran in 2017. Treatments were three plant growth regulators of gibberellin (three levels of 25, 50 and 75 ppm), auxin (five levels of 30, 50, 75, 100 and 150 ppm), ethephon (three levels of 100, 200 and 300 ppm) and control (no application of growth regulators). Flowering criteria including male flower numbers, female flower numbers, the ratio of male to female flower number, the first node of male flower emergence and the first node of female flower emergence were investigated. The results indicated that plant growth regulators significantly affected all measured criteria. Application of 300 ppm ethephon caused the highest number of female flowers while the highest number of male flowers was observed by using 75 ppm gibberellin. Also, the lowest number of female flowers was obtained at 25 ppm gibberellin while the level of 75 ppm gibberellin resulted in the highest ratio of male to female flowers. The emergence of first male flower and also the first female flower in the lower nodes was observed by application of 75 ppm gibberellin and 300 ppm ethephon, respectively.

**Keywords:** Auxin, Eethephon, Gibberellin, Flower, Medicinal pumpkin

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**Study on Anti-Proliferative Activity of *Falcaria vulgaris*.**

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*Falcaria vulgaris* from Umbeliferae family grows in different parts of Iran. It is variously used in folk medicine and named as "Ghaze-yaghi" because of its leaf shape. It is traditionally has been used as dry powder in west and south-west of Iran, to accelerate skin wound healing for centuries. In this study we determined cytotoxic activity of different extracts and effective fractions of *F.vulgaris* on cancer and normal cell lines. Air dried aerial parts of *F.vulgaris* (100 g) were grinded and soxhlet extracted using n-hexane, dichloromethan (DCM) and methanol (MeOH). For further investigation n-hexane and DCM extracts were fractionated vacuum liquid chromatography (VLC). The anti-cancer effect of extracts and their fractions were evaluated by MTT reduction colorimetric assay. MCF-7 (breast cancer), SW-872 (liposarcoma) and HFFF (Normal) cell lines were treated with different concentration of samples. The IC<sub>50</sub> value of extracts estimated from Graph pad prism7 software. The results of the cytotoxicity assay revealed that methanolic extract had not significant anti-proliferative activity on any cell line. In the other hand DCM extract and its 40% and 60% ethylacetate fraction had highest activity on MCF-7 cell line with IC<sub>50</sub> value of 173.8 ± 21.8 µg/mL and 5.66 ± 2.6 µg/mL and 5.45 ± 2.9µg/mL respectively. Also n-Hexan extract and 40% ethyl acetate fraction of it strongly inhibited cell growth on SW-872 cell line with 50% inhibitory concentration value of 8.47 ± 5.5 µg/mL and 22.62 ± 1.5 µg/mL respectively. This study showed anti-proliferative activity of *F.vulgaris*. Further investigations should be carried out to identify and characterize the efficacious phytotherapeutic bioactive compounds of *F.vulgaris* and the mechanisms involved in cancer cell death [1].

**Keywords:** *Falcaria vulgaris*, anti-proliferative, MCF-7, SW-872, HFFF

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## Hypoglycemic Effect *Polygonatum orientale* Rhizome Extract on Diabetes Induced by Streptozotocin in Rat Model.

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*Polygonatum orientale* Desf. (Iranian Shaghaghool or Mohresoleyman), a herbaceous and perennial plant from family Asparagaceae, is native to the forests of northern Iran. The rhizomes of *Polygonatum* is used in Iranian traditional medicine as tonic, aphrodisiac, wound healing, lightening, kidney stone remedy, gynecological and internal wounds healing, anti-gout and rheumatism, and anti-diabetic. The aim of this study was to evaluate the hypoglycemic effect of *P. orientale* rhizome extract and its effects on the antioxidant enzymes in the plasma of the normal and streptozotocin induced diabetic rats. 30 male rats were divided into 6 groups; healthy control, negative control, positive control (metformin, 500 mg/kg) and three groups of diabetic rats (200, 400 and 800 mg / kg) that received the ethanolic (70%) extract orally. After 28 days effects of the extract on blood glucose, superoxide dismutase (SOD) and catalase enzymes, as well as total antioxidant capacity of the plasma (by FRAP test) were investigated. According to the results, the percentage of reduction in blood glucose in the groups of 400 (2%) and 800 (25%) mg / kg compared to the diabetic control group was significantly different, ( $P < 0.05$ ) and ( $P < 0.001$ ), respectively. The difference in blood glucose levels between 400 and 800 mg / kg and metformin was not significant ( $p > 0.05$ ). Also, 200 and 400 mg / kg of the extract reduced the amount of SOD in the plasma comparable to the normal group. None of the extracts were effective in increasing the amount of catalase enzymes and the total antioxidant capacity of the plasma. It can be concluded that the ethanolic extract of rhizome of *Polygonatum orientale* can exhibited a significant hypoglycemic effect in type 2 diabetes.

**Keywords:** *Polygonatum orientale* Desf., Hypoglycemic, Diabetes; Streptozotocin; Rat

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## Investigation of Phytochemical Characteristics of Chia (*Salvia hispanica* L.) by Application of Different Fertilizers and Plant Density.

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In order to investigate phytochemical properties of chia (*Salvia hispanica* L.) under different types of fertilizer and planting distance, a split plot experiment based on randomized complete block design with three replications was conducted in Research Station of Department of Horticultural Science and Landscape, University of Tehran in 2016. Treatments were included different planting distance (70\*50 and 90\*50 cm) and fertilizer types (NPK, cow manure (10 and 15 t.ha<sup>-1</sup>), vermicompost (5 and 10 t.ha<sup>-1</sup>), NPK+ 5 t.ha<sup>-1</sup> manure, NPK + 5 t.ha<sup>-1</sup> vermicompost and control). Criteria such as chlorophyll a, b and total, antioxidant activity, total carotenoid, total phenol and essential oil yield of herbal parts were measured. Results indicated that the main effects of fertilizers and planting distance significantly affected most of the measured traits. According to the results, the highest amount of chlorophyll a, b and total and also total carotenoid was obtained at integration of NPK with 5 t.ha<sup>-1</sup> vermicompost. Application of 10 t.ha<sup>-1</sup> cow manure and also integration of NPK with 10 t.ha<sup>-1</sup> cow manure both resulted in the highest amount of antioxidant activity. Total phenol was around 30 and 25% respectively more in NPK with 5 t.ha<sup>-1</sup> vermicompost and 10 t.ha<sup>-1</sup> cow manure compared with control. The planting distance of 90 cm resulted in the highest amount of all measured criteria. Interaction effects of NPK+10 t.ha<sup>-1</sup> cow manure at 90 cm planting distance caused the highest amount of essential oil yield.

**Keywords:** Antioxidant activity, Chia, Essential oil yield, Herbal part, Total phenol



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**Effect of Different Culture Medium on Phenol, Flavonoid Content and Antioxidant Enzyme Activity in *Hyoscyamus Reticulatus* (Solanaceae) Hairy Roots.**

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The medicinal plant *Hyoscyamus reticulatus* L. is a rich source of hyoscyamine and scopolamine, the tropane alkaloids. The use of hairy root (HR) cultures have focused significant attention on the production of important metabolites such as stable tropane alkaloid production. HR cultures show similar or even higher biosynthetic capacity of secondary metabolite production compared to mother plants, as well as higher genetic and biochemical stability compared to conventional root cultures. Several attempts have also been made to enhance hairy root growth and their production of important bioactive compounds. Optimizing the composition of inorganic nutrients of the media for hairy root cultures is essential to gain high production of secondary metabolites. Antioxidant enzymes such as ascorbate peroxidase (APX), peroxidase (POD) and catalase (CAT) and non-enzymatic components such as phenols and flavonoids can protect plant cells in oxidative stress conditions. In the present study, the effect of different culture medium on the growth and phenol, flavonoid, antioxidant capacity and antioxidant enzymes activity of hairy root cultures of *H. reticulatus* are discussed. Transformed hairy root cultures of *H. reticulatus* were established by infection with *Agrobacterium rhizogenes* strain A7. To determine the phytochemical trait of *H. reticulatus* hairy roots, MS, 1/2MS, 1/4MS, and B5 media were used. The results revealed that the highest total Phenol (3.82 mg GAE per g FW) and flavonoid (7 mg per g FW) content were observed in MS medium. In the case of antioxidant capacity, highest (12.18%) and lowest (8.58%) antioxidant activity were observed in B5 and 1/4MS medium, respectively. Significant variations in antioxidant enzymes activity between the hairy roots cultured on different medium were detected. The highest CAT and GPX activity were detected in hairy root cultures on MS medium, and the lowest activity of both enzymes obtained from hairy root cultured on 1/4MS medium.

**Keywords:** *Agrobacterium Rhizogenes*, Antioxidant Enzyme, Hairy Root, Tropane Alkaloids

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**Anti-Helicobacter Pylori Activity of the Essential Oil of *Ferulago carduchorum*.**

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*Ferulago carduchorum* Boiss. & Hausskn. belongs to the Apiaceae family. This plant grows in west part of Iran. *Helicobacter pylori* (*H. pylori*) colonizes the stomachs of about 50% of the world's human population. This organism is the main risk factor for peptic ulceration as well as gastric mucosal-associated lymphoid tissue (MALT) lymphoma and gastric adenocarcinoma. The prevention of *H. pylori* colonization could potentially provide primary prevention of the mentioned diseases. The aim of this study was to investigate the composition of essential oil of *F. carduchorum* and to evaluate the activity of *F. carduchorum* against clinical isolates of *H. pylori*. Micro-well dilution assay was conducted for the assessment of plant minimal inhibition concentration (MIC) using the CLSI (The Clinical & Laboratory Standards Institute) method. Results: The results of essential oil analysis of *F. carduchorum* were led to identification of 43 compounds, represented 92.3% of the total oil. The oil yield of the plant was determined as 1.3% v/w. Major component of essential oil were identified as (Z)- $\beta$ -ocimene (43.3%),  $\alpha$ -pinene (18.23%), bornyl acetate (3.98%) and myrcene (3.15%). Minimum inhibitory concentrations (MIC) measured for essential oil of *Ferulago carduchorum* against 6 clinical isolates of *H. pylori* were 18.97, 9.48, 18.97, 9.48, 18.97, 18.97 mg.ml<sup>-1</sup>, respectively. The MIC of Clarithromycin as positive control against 6 clinical isolates of *H. pylori* was 0.002 mg.ml<sup>-1</sup>. Discussion: Results showed that among 43 identified components, monoterpenes were the most identified compounds (84.63%) that only 5.99% of them were oxygenated whereas, sesquiterpenes were totally detected about 6.65% with 0.71% oxygenated sesquiterpenes. (Z)- $\beta$ -ocimene and myrcene as acyclic monoterpene hydrocarbons and  $\alpha$ -pinene as a cyclic monoterpene hydrocarbon were identified as main compounds. Also the major oxygen containing monoterpene and sesquiterpene are bornyl acetate (3.98%) and spathulenol (0.71%), respectively. The essential oil of *F. carduchorum* showed antibacterial activity against 6 clinical isolates of *H. pylori*. The Minimum inhibitory concentrations of essential oil against clinical strain 2 and 4 were lower than other strains. In comparison with other herbal essential oil, *F. carduchorum* showed potent anti *H. pylori* activity. The determination of antibacterial activity of the essential oil have great importance in pharmaceutical industries for finding new drugs from natural sources.

**Keywords:** *Ferulago carduchorum*, Essential oil, Antimicrobial, *Helicobacter pylori*

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**The Study of Fatty Acid in Two Species of *Fallopia* Adans. (Polygonaceae) in Iran.**

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The content of fatty acids and its usage in separating species in the Polygonaceae family has not been studied. There is just a study about Boraginaceae Family and Onosma. In this study, *Fallopia convolvulus* and *Fallopia dumetorum* from Polygonaceae were examined. The method that was used for extraction was cold method. According to observations the most abundant fatty acids in *F. dumetorum* was Linoleic acid and in *f. convolvulus* was Oleic acid. The findings of this study showed that the study of fatty acid in *Fallopia* Adans. Can help to identify the species from each other.

**Keywords:** Polygonaceae, *Fallopia* Adans., Fatty acids, Iran

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**Investigation and Comparison of Saponin Contents in Different Populations of *Achillea wilhelmsii* C.Koch.**

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*Achillea* L. is belonging to Asteraceae family which has a global distribution and includes 18 species in Iran [1]. A wide range of secondary metabolites including saponins have been reported in this genus. Saponins or saponosides are amphiphilic glycosides, which are composed of hydrophobic sapogenin and hydrophilic sugar moieties. They are used for industrial and pharmacological purposes. Aim of this study was investigation and comparison of saponin contents in different populations of *Achillea wilhelmsii* C.Koch which grown in Iran. Based on geographical location, samples were collected from 12 different locations in Isfahan, Qazvin and Kohgiluyeh and Boyer-Ahmad Provinces. The collected plants (leaves and flowers) were dried at room temperature and shading. At first, dry materials were extracted by ethanol 70% using a combination of three methods including maceration, ultra sound and microwave techniques. Then, crude extract were fractionated by three solvent systems. Saponin content of each fraction was assayed according to Wu et al. (2013) method at 560 nm. Our results showed that leaf and flower tissues of the *A. wilhelmsii* populations had a considerable amount of saponin. In all studied populations, total saponin of the leaves was higher than the flowers. Comparison of the total saponin means among different populations showed that three populations which collected from Kashan had generally the highest total saponin. In the leaf tissues, highest total saponin contents were estimated in Qazvin, Kashan-2 and Vadeghan populations (209.5 to 231.4 mg/g DW); and the lowest total saponin contents were assayed in the samples which collected from Farsian village and Qazvin suburb (respectively 101.6 and 126.2 mg/g DW). As well as in the flowers tissues, the samples which collected from Kashan-2 and Qazvin suburb had the highest and lowest amounts of saponin content, respectively (197.9 and 76 mg/g DW). It seems that different environmental factors such as temperature, altitude, humidity and biotic stress in growth media of the plants affected saponin content in *A. wilhelmsii*. Same as our results Szakiel et al. (2010) showed that amount and type of synthesized saponins can be verified by environmental factors including light, temperature, humidity, soil fertility, carbon dioxide levels, and climate and geographical conditions.

**Keywords:** *Achillea wilhelmsii* C.Koch, Populations, Saponin

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## Quality Control of “Ustukhuddus” Prepared from Herbal Markets in Iran (phase II).

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Ustukhuddus has been used as an anticonvulsant, antidepressive, anxiolytic and sedative. The plant available in the herbal market may adulterated and substituted by another genus. The aim of this study was in Iranian traditional and folk medicine quality control of 5 different samples after general quality control tests on 10 samples [2]. Supplementary quality control experiments includes micro morphological studies, microbial control, determination of water soluble extractable matter and lipophilic compounds, phytochemical compounds and finger printing by TLC and HPLC were assessed on 5 selected samples. In microscopic evaluation of samples, different types of covering and glandular trichomes observed and in microbial studies, the results were in the permitted level. The amount of water-soluble extract and lipophilic compounds in samples were 17-20% and 2-5% respectively. The phytochemical assay revealed the presence of flavonoids, alkaloids, tannins, saponins, glycosides and steroids. In fingerprint tests by TLC and HPLC, the apparent pattern of these 5 samples are similar and the difference was in the amount. According available information, *Nepeta menthoides* is used as Ustukhuddus in Iranian herbal market. Macroscopic, microscopic and phytochemical results are available. Our study shows the importance of supplementary methods for QC of The proposed methods can be used for QC of Ustukhuddus.

**Keywords:** Quality control, HPLC, TLC, Ustukhuddus, *Nepeta menthoides*

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## The study of Cytotoxicity of *Citrullus colocynthis* in PC-12 Cell Line.

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*Citrullus colocynthis* (L.) fruits are traditionally used for treatment of diabetes in eastern nations. The present study evaluated the cytotoxicity of the total methanolic extract of bitter melon in PC12 cells as an appropriate *in-vitro* model for investigation of neuronal functions. Method: Pheochromocytoma (PC12) cells, were seeded in 25 cm<sup>2</sup> flasks and maintained in RPMI 1640. Cell viability was assessed by MTT assay. After various extract dose treatment, 20 µL MTT reagent was added and the plate was incubated at 37°C for 24h and 48 h. The medium was removed and 150 µl DMSO was added. The absorbance of each well was read at 570 nm using a microplate reader. Cell viability was expressed as a percentage of the value against the untreated control. Results: Despite our expectation, the present results indicated that the extract of bitter melon decreased the concentration of PC12 cells at a dose depended manner but it was not toxic to the cells at the experimental concentrations, up to 1000 µg/ml. Conclusion: These findings showed that *Citrullus colocynthis* extract was not cytotoxic towards PC12 cells, which may be contributed to its antioxidant effect and inhibition of cellular oxidative stress.

**Keywords:** *Citrullus colocynthis*; MTT; PC12 cells

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## Effect of Fennel and/or Ajwain Essential Oils on Blood Metabolite, Oxidative Status and Histopathology of Liver in Wistar Rats Suffered Dexamethasone Stress.

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The aim of present study was to investigate effect of feeding fennel and/or ajwain essential oils on performance, blood metabolites, oxidative status and histopathology of liver in rats suffered dexamethasone stress. Total of 40 adult male Wistar rats were allocated to 5 experimental groups and 8 replicates each. The experimental groups were: 1- Control, no stress and no supplementation (CON), 2- Stress, under stress condition and no supplementation (STR), 3- Fennel, under stress condition and feeding fennel essential oil (STR+FE), 4- Ajwain, under stress condition and feeding ajwain essential oil (STR+AE), 5- Fennel+Ajwain, under stress condition and feeding fennel + ajwain essential oils (STR+FE+AE). The stress induction was performed by daily i.m. injection of dexamethasone (1 mg/kg BW/d). Essential oils of fennel and/or ajwain were fed by gastric gavage (100 mg/kg BW) in a 21 d period. Results showed that CON group had higher ( $P < 0.05$ ) body mass index, body weight and feed intake compared to the other groups. The relative weight of liver in STR group was greatest ( $P < 0.05$ ) and feeding essential oil decreased this parameter compared to the STR rats. Results of blood metabolites showed that serum albumin in the STR group was higher ( $P < 0.05$ ) than those the others. The activity of alanine amino transferase (ALT) and aspartate amino transferase (AST) enzymes was higher ( $P < 0.05$ ) in the STR group compared to the CON group. The stress induction without essential oil supplementation (STR), decreased ( $P < 0.05$ ) serum concentrations of superoxide dismutase and glutathione peroxidase enzymes. The liver damages was improved by feeding fennel essential oil (STR+FE). It was concluded that fennel and ajwain essential oils had potential to improve the oxidative status of rats suffered dexamethasone stress.

**Keywords:** Stress, Essential oils, Blood metabolites, Histology, Rat

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## Effect of Priming with Folic Acid on Germination Properties of the Purslane (*Portulaca oleracea L.*) under Drought Stress.

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In order to evaluate the effect of priming on germination and growth of purslane (*Portulaca oleracea L.*) under drought stress condition and to determine the best priming treatment under stress condition, an experiment was carried out as completely randomized design with three replications in University of Maragheh. Treatments were priming at three levels (non priming and priming with folic acid, 50  $\mu$ m and 25  $\mu$ m) and drought stress at seven levels (0, -0.5, -1 and -1.5 Mpa). Results showed that with increasing drought stress from 0 to -1.5 bar, germination properties such as germination percent, germination rate and weight of seedling, length of radicle and plumule, ratio of root to shoot length and seedling vigour index decreased. But, this decrease in non control treatment was more than priming treatment. The results showed that priming increased germination percentage. Results indicated that length of stem, root, and weight of seedling indices were affected by priming treatment and drought stress but in -1.5 bar were not significant. This treatment enhanced germination ratio under stress (drought) and non-stress conditions. While, priming is simple, cheap and sophisticated equipments. Therefore, could be used to improved seed performance of purslane under drought stress.

**Keywords:** Folic acid, Priming, Drought stress, Purslane

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## The Effect of Plant Growth Regulators on Morphological Characteristics of Licorice (*Glycyrrhiza Glabra L.*) in *in Vitro* condition

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Licorice (*Glycyrrhiza glabra L.*) is the most important medicinal plant with a wide range of applications in various industries such as pharmaceutical, food, cosmetics and healthcare. This plant is propagated mainly by vegetative approaches. Tissue culture technique is known as a powerful tool for mass propagation of superior genotypes. It has been shown that the plant growth regulators (PGR) and medium have interaction on plant regeneration and morphological characteristics. Therefore, this study aimed to evaluate the effect of plant growth regulators on the morphological characteristics of licorice *in vitro* grown seedlings. In this assay, a superior genotype which collected from Yasoj province was used for different PGR treatments. First, the single node explants of this genotype were cultured on MS medium containing a combination of four different growth regulators such as 6-Benzylaminopurine (BAP), Indole-3-butyric acid (IBA), Kinetin and Gibberellic acid (GA<sub>3</sub>). Various parameters were recorded after 90-days of culture. Mean comparison showed that there were significant differences ( $p \leq 0.05$ ) among the PGR concentrations for the shoot length, number of internodes, internode length, root length, number of roots and leaves. Among the treatment, the concentration of  $1 \frac{Mg}{l}$  BAP,  $0.5 \frac{Mg}{l}$  IBA,  $0.5 \frac{Mg}{l}$  Kin and  $0.1 \frac{Mg}{l}$  GA<sub>3</sub> was the best PGRs combination for optimum growth of licorice *in vitro* plantlets, with the average of 41.10 and 15 cm for the stems length and number of internodes, respectively.

**Keywords:** Licorice, *in vitro*, Explants, MS medium, Plant growth regulators

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## Study of the Polyphenols Contained in the Fruits of *Smyrniopsis aucheri*.

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*Smyrniopsis aucheri* Boiss synonym with *S. armena Schisch* (Apiaceae) is distributed in Anatoly, Transcaucasia, Iraq and the North West, West and central region of Iran. Although the seeds of this plant were recently offered as remedy for treatment of vitiligo, but it is not famed as a medicinal plant in traditional medicine. Our preliminary studies showed that fruits of this species are rich of coumarin, furanocoumarin and flavonoid compounds. On account of importance of these compounds in medicine and pharmacology (as anticoagulant, anti-inflammatory, antimicrobial, antifungal, antiviral, anti-HIV, antioxidant, anti-allergic, antidepressant, antidiabetic, anticancer, anti-proliferative, anti-parkinsonism activity, various enzyme and receptor inhibiting activities and other biological activities, we decided to identify the nature of these compound in fruits of the plant. For this purpose, fruits were powdered and extracted by n-hexane, dichloromethane and methanol, successively. n-Hexane-extract was fractionated with VLC technique using ethylacetate-hexane mixtures and the yielded fractions were analysed by TLC method. Further purification was done by column chromatography. The methanolic extracts were fractionated with SPE (Sep-pak; ODS) method and the components of each fraction were purified by HPLC. The structure of purified compounds was elucidated by <sup>1</sup>H, <sup>13</sup>C-NMR spectroscopy. Accordingly, 16 polyphenolic compounds including coumarins, furanocoumarins and flavonoids were isolated and identified in the fruits of plant. Apterin, Psoralen, Xanthotoxol, glycosylated derivative of Peucedonare some of the identified coumarins. All of the identified compounds are being reported for the first time from the *Smyrniopsis aucheri*. We suppose that coumarins, furanocoumarins and flavonoids in fruits of *Smyrniopsis aucheri* aid most probably defence action against microbial and fungal infections, control the germination of seeds and protect the plant tissues against ultraviolet radiation.

**Keywords:** Coumarins, Flavonoids, Furanocoumarins, *Smyrniopsis aucheri* Boiss

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## Evaluation of Different levels of Mycorrhiza and Planting Media and its Interaction Effects on Length of Root and Alkaloid as Ajmalicine of Periwinkle (*Catharanthus alba*).

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Periwinkle (*Catharanthus alba*) is one of the most important medical and ornamental plants in the world that is contained alkaloids as vinblastine, vincristine (in the young leaves that is used in treatment of different kinds of cancers) and ajmalicine (in the root that is employed to reduce high blood pressure) [1]. In order to determine the effects of different levels of two mycorrhiza biological fertilizer (*Glomus mousea*, *Glomus intraradices*) and four planting media on length of root and alkaloids as ajmalicine of *Catharanthus alba* plant, an experiment was conducted as a factorial based on randomized complete block design (RCBD) with three replications and each replication consisted of 12 treatments. length of root and alkaloid as ajmalicine characteristics were affected significantly ( $P < 5\%$ ) by application of mycorrhiza. Also the both of the traits were meaningfully influenced by the planting media. The interaction effects of mycorrhiza and planting media on were not affected significantly by the interaction of mycorrhiza and planting media.

**Keywords:** Periwinkle (*Catharanthus alba*), Mycorrhiza, Manure, Vermicompost, Compost

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## Investigation of the Response of Various Black Cumin (*Nigella sativa* L.) Genotypes to Callus Induction.

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Black cumin (*Nigella sativa* L.) is an annual plant and native to Southwest Asia. This plant has several medicinal applications. Tissue culture is one of the newest methods that plays a major role in the production and improvement of medicinal plants. Callus induction is one of the main stages in plant tissue culture, which provides primary material for whole plant production and other aspects of research. In order to study the response of six black cumin genotypes to callus induction, this experiment was carried out in central laboratory of Yasouj Agricultural College in 2017- 2018. Hypocotyl explants were collected from young seedlings and placed in the MS medium containing Kinetin (0, 1, 1.5 and 2 mg/L) and 2, 4-D (1 and 2 mg/L). Callus percentage, width, length, volume and fresh and dry weight measured after 21 days. The experiment was factorial in a completely randomized design with three replications. The results of analysis of variance showed that the main effects and their interactions were significant for all measured traits except for 2, 4-D for callus length. The combination of 1 mg/L 2, 4-D and 1 mg/L Kinetin produced 100% callus induction in Shahreza genotype. In this genotype, 1 mg/L of 2, 4-D and Kinetin were the best combination for callus length (99 mm) and wide (86 mm). In Semirom genotype, the combination of 1 mg/L 2,4-D and 2 mg/L Kinetin had the highest callus volume (0.4 ml<sup>3</sup>) and finally 2 mg/L 2,4-D and Kinetin was the best plant growth regulators for dry (13.4 mg) and fresh (257 mg) callus weight in Esfahan genotype. In general, the results indicated that genotypes had different responses to callus induction in different treatments of plant growth regulators. The results of this research can be used for the production and reproduction of black cumin in tissue culture conditions.

**Keywords:** Black cumin, Medicinal plants, Tissue culture



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**Effect of Sowing Date and Nano Fe Chelate on Yield and Active Substance of *Matricaria recutitacv.* Soroksari.**

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Chamomile is a well-known medicinal plant species from the Asteraceae family. Nowadays, chamomile is a highly favored and much-used medicinal plants throughout the world. In order to study the effect of sowing date and Nano Fe chelate on morphological and phytochemicals characteristics of *Matricaria recutita* CV. Soroksari, the experiment was carried out with split plot design based on randomized complete block design (RCBD) with three replication in Roodbal, Fars province, Iran during 2016-2017. Main plots consisted of two sowing dates (Spring-Autumn) and sub-plots included four nano Fe chelate rates (0,0.5,1,1.5%). The results showed that sowing date had significant effect on flower diameter, fresh and dry flower weight, fresh and dry weight of flower per plant, essential oil production, Chamazulene content and product. Nano Fe chelate had significant effect on flower diameter, essential oil and Chamazulene content. The interaction of the factors was significant only on the Chamazulene and essential oil content. In all investigated traits, the highest amount was observed in autumn. The highest flower diameter, essential oil content at 1% concentration and the highest Chamazulene content was observed in 0% concentration of Nano Fe chelate. The highest content of essential oil was observed in 1 and 1.5% concentration and the highest content of chamazulene in autumn with 0% concentration on nano Fe chelate.

**Keywords:** *Matricaria recutita*, Sowing date, Nano Fe chelate, Yield, Active substance

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**The Investigation of Petal Pigments and Total Phenolic Compounds of Damask Rose (*Rosa damascene*) Collected from the Eastern and Western Azerbaijan Provinces.**

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Considering the fact that since the second half of last century many pharmacodynamics studies have been carried out about medicinal plants in the most countries of the world and then many medicinal plants has been prepared and marketed, so it is important to study the chemical composition of plant grown in Iran [1]. *Rosa* spp. belong to Rosacea family which is one of the most important species of *Rosa damascene* that is called "Gole Mohammadi" in Persian. Due to scent of flowers and high content of active biological compound, Damask Rose has attracted considerable attention in horticulture, biochemistry, pharmaceutical industries. Considering the fact that Damask Rosa has a high value in terms of medicine and economic and Eastern and Western Azerbaijan are the main homeland of this plants, the flowers were collected from the late may to the late June in northwestern Iran (Eastern and western Azerbaijan). Plant samples were transferred to medicinal plants laboratory of Horticulture Department of Urmia University from 26 areas and Carotenoid and Anthocyanin pigments were evaluated. All data was analyzed with three replication and simple and simple one-way analysis using SAS software (ver. 13). The result showed that each four factors of total phenol, total flavonoids, anthocyanin and carotenoids had a significant difference ( $p < 0.01$ ). The highest amount of total phenol and total flavonoid was in genotypes G1 and the highest amount of anthocyanin was in genotype G20. Also the highest amount of carotenoid is in G11 genotype. The lowest total phenol and flavonoid content was in G6 genotype. The lowest anthocyanin level was observed in genotype G15. genotype G13 has the lowest Carotenoid. Generally, according to the results of the research, G20 and G24 genotypes is recommended for higher levels of anthocyanin. Genotype G1 also can be used because of high phenolic compounds, compounds are interested in medicinal plant related industry.

**Keywords:** Anthocyanin, Carotenoid, Damask Rose, Total phenolic compounds

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## A Comparative Study on Phenolic Acid Profiles in Leaves and Roots of Eleven Wild Populations of *Salvia leriifolia* Benth. from Iran

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*Salvia leriifolia* Benth. (Lamiaceae) is a perennial herbaceous plant, which has been used for different purposes in traditional as well as modern medicine. This plant grows as wild populations in Khorasan and Semnan provinces of Iran and some parts of Afghanistan. Unlike other species of *Salvia* genus, the chemical constituents of *S. leriifolia* are not well known however recently the existence of some phenolic acids such as rosmarinic acid, salvianolic acid B and caffeic acid have identified in this species. Phenolic acids and their derivatives are medicinally important plant metabolites. The present study was aimed to investigate the variations in phenolic acids content of eleven populations of *S. leriifolia*. Mature seeds were collected from wild grown plants in different areas of Khorasan (Razavi, South) and Semnan provinces. The seeds were planted in plastic pots containing coco peat. Seedlings at the four- leaf stage were transferred to 8 kg plastic pots filled with garden soil, coco peat perlite and sand (1:1:1 w/w). The plantlets with 28 leaves were harvested and dried at room temperature. The dried samples were extracted with methanol (80%) by cold maceration and then were analyzed for five individual phenolic acids (rosmarinic acid, salvianolic acid A, salvianolic acid B, lithospermic acid and caffeic acid) by HPLC method. The highest contents of rosmarinic acid (4.46 mg/g DW), salvianolic acid A (0.275 mg/g DW) and lithospermic acid (1.13 mg/g DW) were measured in the leaves of Sarogh population, however the leaves of Helali population were rich (3.27 mg/g DW) in salvianolic acid B. The maximum level (5.64 mg/g DW) of caffeic acid was detected in the roots of Torbat population. Our results showed that different populations had different potential for the production of phenolic acids. Sarogh, Helali and Torbat populations were highly recommended, as good sources of phenolic acids, for further evaluation of their potential to produce phenolic compounds.

**Keywords:** Caffeic acid, Population, Rosmarinic acid, Salvianolic acids, *Salvia leriifolia*

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## Quantity and Composition of the SDE Prepared Essential Oil of *Satureja macrantha* bung.

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The essential oils from flowering aerial parts of *Satureja macrantha* bung., from Iran, have been analysed by GC and GC–M. This essential oil was prepared by a modified Likens–Nickerson's simultaneous distillation–extraction (SDE) method. Twenty six compounds in the oil of *Satureja macranthabung*, representing 97.4% of the total oil were identified. The oil of *Satureja macranthabung* was rich in monoterpenes (47.9%) with carvacrol (13.3%) Alpha- terpinene ( 3.43% ), p- Cumene( 2.51% ), p- cymene ( 2.93% ) and Thymol (2.11% ) were the major components of the oil.

**Keywords:** *Saturejamacranthabung*, Essential oil composition, GC/MS

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**Investigation of Copper Sulfate Effects on the Germination Characteristics and Anatomical Structures of Vegetative Organs of *Rumex crispus L.***

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Copper is an essential trace element for plants, so that its deficiency affects the metabolism of plants. High levels of toxicity caused by reactive oxygen species are created. This study aimed to investigate the effect of different levels of copper sulfate on the germination and anatomical structure of *Rumex crispus L.* was conducted in a completely randomized design. Applied stress in this test include different levels of copper sulfate at concentrations of 0 (treatment of control), 1, 3, 4, and 7 mg per liter. The results showed that germination percentage and germination rate were not significant at the 5% level, but the length of shoot and root, shoot and root fresh weight, dry weight of shoot and root were significant at the 5% level. Also, copper sulfate reduces the length of the stem & root and branching of root. In the anatomical study, with increasing levels of copper sulfate, mesophyll leaf thickness decreased. In the root with the increasing concentration of copper sulfate, the thickness of the parenchyma, phloem and xylem declined. In the stem, except cuticle, the other studied tissue thickness decreased with stress. The lowest parenchyma, phloem and xylem thickness were observed in the treatment of 7 mg/Kg of CuSO<sub>4</sub>. Copper stress caused an increase in the stem tissues thickness with the exception of cuticle.

**Keywords:** Rumex, Anatomical structure, Germination percent, Xylem, Seed vigor

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**Anti-Proliferative Activity and Phytochemical Analysis of *Scrophularia subaphylla.***

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Medicinal plants have always been regarded as a valuable source of new bioactive lead compounds in drug development researches. *Scrophulariasubaphylla* belonging to the family Scrophulariaceae is a perennial plant native to the Mediterranean area. Some biological activities of *Scrophularia* species have been reported as antitussive, anti-proliferative and anti-inflammatory. The current study was assigned to chemical composition and also evaluate the total phenol, total flavonoid contents along with Antioxidant and anti-proliferative properties of extracts from *Scrophularia subaphylla*(*S. subaphylla*). The air-dried aerial parts of *S. subaphylla* (100 g) were Soxhleted with n-hexane, dichloromethane and methanol solvents. Furthermore, methanolic extract was fractionated over a C-18 pre-packed cartridge (Sep-pak) and chromatographic separation was performed on a reversed-phase preparative HPLC. Structural elucidation of the isolated compounds was carried out using <sup>1</sup>H-NMR and <sup>13</sup>C-NMR spectral analyses. Furthermore, total phenolic, total flavonoid, antioxidant and anti-proliferative activities (against MCF<sub>7</sub>, HT29 and L929 cell lines) of all extracts were determined by Folincioucalteu, AlCl<sub>3</sub>, DPPH and MTT assay, respectively. Phytochemical investigation on the methanolic extract led to the isolation and identification of three compounds from 10% and 40% methanol-water Sep-pak fractions, Antirrhinoside, Aucubin, and dehydroxymartinoside respectively. Among the extracts, methanolic extract, showed high anti-proliferative activity against MCF<sub>7</sub> cell line (breast cancer) (IC<sub>50</sub>= 241.90 ± 30.1 mcg/ml). Furthermore, methanolic extract indicated high antioxidant activity (RC<sub>50</sub>= 0/28± 0/08 mg/ml) with high contents of total phenol (63.46 ± 0.14 mg g<sup>-1</sup> as gallic acid equivalents) and total flavonoid (141.56 ± 20.31 mg g<sup>-1</sup>). The results of present study introduce *S. subaphylla* as a new source of iridoid glycosides and phenylpropanoids. Generally, the results of TPC, TFC, antioxidant and anti-proliferative activity of extracts were in agreement with each other. And suggest it as an appropriate anti-cancer agent against breast cancer cell line.

**Keywords:** Antioxidant activity, Anti-proliferative, *Scrophularia subaphylla*

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## Comparison of Cultivated and Natural Habitat of Dragonhead "*Dracocephalum kotschyi*" from Central Part of Iran.

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The investigation of different Dragonhead (*Dracocephalum kotschyi*) from Iran's Natural habitat, and cultivated areas was carried out in order to compare them with respect to their active ingredients and to examine the possibility of extensive cultivation and access to the plant for product design. The Dragonhead of a half-timbered plant of the Labiatae family is found in Southeast Asia. Antihyperlipidemia and immune system stimulating effects have been reported for this species. *D. kotschyi* is one of its unique species in Iran, which is known as Golden plant (zarringiah). In this project, Dragonheads were collected from natural habitats and cultivated fields of Totmaj Village-Kashan (Cultivated)-dry, Totmaj Village-Kashan (Cultivated)-wet, Fereydonshar (Cultivated)-dry, Fereydonshar (Cultivated)-wet, Barzok- Kashan (Natural habitat)- dry, Nashalj- Kashan (Natural habitat)- dry at flowering time, and after drying. The fields were assigned into different codes, and then their essential oils (wet & dry) were collected by the use of Clevenger apparatus and analyzed by GC and GC/MC. The results indicated the presence of E-Citral, Z-Citral, Limonene, and  $\alpha$ -Pinene as major constituents of *D. Kotschyi*.

**Keywords:** Essential compounds, Dragonhea, *Dracocephalum kotschyi*

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## Phytochemical Analysis and Biological Activities of *Scrophularia frigida* Growing in Iran.

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The genus *Scrophularia* L. from the Scrophulariaceae family, commonly known as a «*golemeimuni*» is one of the most important and widely distributed genera in the Mediterranean area. This genus is comprised of approximately 300 species worldwide, and 42 species are represented in Iranian flora, of which 19 species are endemic. The current study was assigned to phytochemical analysis and evaluate the total phenol and total flavonoid contents as well as Antioxidant and anti-microbial properties of extracts from the aerial parts of *Scrophulariafrigida* (*S. frigida*) as one of the mentioned species. The air-dried aerial parts of *S. frigida* (100 g) were individually Soxhleted with n-hexane, dichloromethane and methanol solvents. For further investigation, methanolic extract was concentrated using a rotary evaporator at 45 °C. Furthermore, methanolic extract was fractionated over a C-18 pre-packed cartridge (Sep-pak) and chromatographic separation was performed on a reversed-phase preparative HPLC. Structural elucidation of the isolated compounds was carried out using 1H-NMR and 13C-NMR spectral analyses. Furthermore, total phenolic, total flavonoid, antioxidant and anti-microbial activities of all extracts were determined by FolinCioucalteu, AlCl<sub>3</sub>, DPPH and Disc diffusion method, respectively. Phytochemical investigation on the methanolic extract led to the isolation and identification of four compounds from 10% and 60% methanol-water Sep-pak fraction, Phlorigidoside B, Penstemoside, Harpagide and verbascoside respectively. None of the extracts showed anti-microbial effect against microbial strains. However, among the extracts, methanolic extract indicated high antioxidant activity (RC<sub>50</sub>= 0.134± 0.04 mg/ml) with high contents of total phenol (37.89 ± 2.18 mg g<sup>-1</sup> as gallic acid equivalents) and total flavonoid (72.08 ± 1.63mg g<sup>-1</sup>). The results of present study introduce *S. frigida* aerial parts as a new source of iridooides and phenyl ethanooides. And suggest it as an appropriate radical scavenger with high amount of total phenols.

**Keywords:** Antioxidant activity, *Scrophularia frigida*, Phytochemical

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**Effect of Boron on the Growth Response in Mycorrhizal Fungi and Plant Growth Promoting Rhizobacteria Inoculated on *linum usitatissimum* L.,**

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Boron is an essential micronutrient for plants, but its stress is a worldwide agricultural problem in arid and semi arid regions. Vesicular-Arbuscular mycorrhizal with Plant Growth Promoting Rhizobacteria can eliminate boron deficiency and toxicity in both vegetative and reproductive growth in various crops. The aim of this study was to investigate the influence of *Glomus versiforme* and *Micrococcus Yunnanensis* on linseed (*linum usitatissimum*) growth in different boron levels (0, 2.5, 5, 10, and 20 mg B/kg soil) in a completely randomized design with four replicates. This experiment was conducted under greenhouse conditions, in Shiraz University for 10 weeks. The obtained evidences indicated that application of boron (2.5, 5, 10, 20 mg/kg) caused chlorosis followed by necrosis at the leaves tips and inhibition of root elongation in *L. usitatissimum*. The all linseed showed a decrease in fresh / dry shoot root weight, and length compared to the control. The fresh/dry shoot and root weight, increased significantly in inoculated plants with fungi and bacterium compared to uninoculated plants but did not show any significant difference in shoot and root length. The results showed less toxicity symptoms and much less boron content (azomethine-H method) in shoot tissues in presence of fungi and bacterium. The data showed that fungi and bacterium infection can prevent excessive uptake boron and decrease effects of boron toxicity, thus could be used to ameliorate excess boron.

**Keywords:** Vesicular-Arbuscular mycorrhizal, *linum usitatissimum*

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**Effect of Bio-Fertilizers on Quality and Quantity Characteristic of Dragon's Head (*Lallemantia iberica*) Under High Water Stress.**

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Dragon's head (*Lallemantia iberica* Fish. Et Mey., Labiate family) is one of the important annual medicinal plants that are valuable sources in Iranian natural resources whose understanding and scientific cultivation can play an important role in people's health [2]. The rhizosphere microbes play an important role in improving medicinal values of medicinal plants. The role of microbes in plant growth, nutrient availability, drought resistance, yield and quality of medicinal compounds is demonstrated in medicinal plants. A wide variety of bacteria and fungi diversity including AM fungi is recognized in the rhizosphere of medicinal plants that have high significance in plant nutrient acquisition and secondary metabolite alteration. The inoculation of PGPR and/or AM fungi is a sustainable technology to enhance the quantity and quality of the medicinal plant compounds [1]. In order to evaluate the effect of biofertilizer on the plant height, biological yield, percentage and yield of essential oil in Dragon's head under severe water stress condition (Irrigation after 160 mm of evaporation from pan class A), an experiment as complete randomized block design was conducted with four treatments and three replications in 2015 and 2016 years at the Agriculture Research Field of Shahid Beheshti college of Urmia. Treatments include *Glomus verruciform*, *Glomus intraradices*, biological phosphorus (Barvar 2) and control. Seed inoculation with biofertilizer Barvar 2 led to increase in plant height and eventually biological yield. Results showed that maximum plant height (27 cm) and biological yield (2439 kg/ha) were obtained from application of Barvar 2. The means comparison showed that the highest percentage of essential oil was observed in 2015 oil (0.23 %) and in 2016 (0.15 %) by application of *Glomus verruciform* and *Glomus intraradices*, respectively. Maximum yield of essential oil (1.26 kg/ha) was obtained by application of biological phosphorus (Barvar 2). On the other hand, under severe water stress condition application of Barvar 2 and/or mycorrhizae were recommended, due to produce maximum plant height, biological yield, percentage and yield of essential oil.

**Keywords:** Biological phosphorus, Essential oil, *Lallemantia*, Mycorrhizae

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**Study of Different Isolates of *Dunaliella salina* Microalga for Natural  $\beta$ -Carotene as a Drug.**

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Carotenoids, also called tetraterpenoids, are organic pigments that are produced by plants and algae, as well as several bacteria and fungi. Some of these molecules are pro-vitamin A and have a range of diverse biological functions, especially in relation to human health. There are more than 400 natural carotenoids and the most important one is  $\beta$ -carotene and that is generally regarded as the most commercially important and widely used carotenoid.  $\beta$ -carotene is used as a food coloring agent, antioxidant, important safe pro-vitamin A source. Nowadays there is a global tendency to develop a cancer fighter medicine based on the antioxidation feature of  $\beta$ -carotene. *Dunaliella salina* has been widely studied for natural  $\beta$ -carotene production. In this study, 5 different isolates of *Dunaliella* microalga obtained from Maharlu salt lake southeast of Shiraz, Iran and morphologically identified as *D. salina*. Identified microalgae were cultured in modified Johnson medium. Cultures were maintained in a temperature controlled at  $(22 \pm 2)^\circ\text{C}$  with illumination provided under a 16 h light, 8 h dark cycle by cool white fluorescent with a light intensity of  $100 \mu\text{M photons m}^{-2} \text{s}^{-1}$ . Five isolates were harvested in the fourth week. Cell proliferation was determined by a Neubauer haemocytometer. Total carotenoid was determined according to Lichtenthaler method. The result showed that one of the isolate accumulated more  $\beta$ -carotene than others. We recommend applying this isolate for natural  $\beta$ -carotene production.

**Keywords:**  $\beta$ -carotene, Microalga, *dunaliella salina*, Drug, Isolate

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**Ecophysiological Aspects of Pyrrolizidine Alkaloids and Phenolic Compounds Distribution in Iranian *Lithospermum officinale* L.**

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Preparations and extracts of plants which are used in the traditional medicines, may contain toxic compounds. It has been shown that various parts of plants in Borage family namely *Lithospermum officinale* contain pyrrolizidine alkaloids which can produce hepatotoxic effects. Due to the valuable phenolic acids content, *L. officinale* extract is currently used in cosmetic formulation. It has also been recommended for therapeutic uses. However, the existence of pyrrolizidine alkaloids in *L. officinale* extract has limited its widespread applications. Environmental conditions including latitudes, day length, light quality, temperature, season, and stresses can significantly affect both growth and metabolism of a plant [1]. Phenolic content considered as an indicator of the environmental conditions. To see how the environmental conditions influence total pyrrolizidine alkaloids (TPyA) and total phenolic content (TPC) of *L. officinale*, 4 specimens were collected from Kelardasht ( $36^\circ 28' 05.78''\text{N}$ ,  $51^\circ 05' 59.51''\text{E}$ ), Tehran ( $35^\circ 50' 19.73''\text{N}$ ,  $51^\circ 25' 16.77''\text{E}$ ), south Damavand ( $35^\circ 38' 05.80''\text{N}$ ,  $51^\circ 59' 49.85''\text{E}$ ), and Estahban ( $29^\circ 06' 43.26''\text{N}$ ,  $54^\circ 01' 53.08''\text{E}$ ) in May 2017. TPyA of the leaves and roots was measured based on. TPC was measured by spectrophotometric method of Folin-Ciocalteu. Results showed a correlation between the latitude of the habitats and TPyA of the roots so that the Estahban and Kelardasht samples showed the highest ( $28.7 \text{ mg.g}^{-1}$  dry root) and the lowest ( $0.2 \text{ mg.g}^{-1}$  dry root) TPyA, respectively. Interestingly, the TPC of the root and leaf samples were almost comparable. The results also confirmed the absence of alkaloids in the leaf extracts of all the examined specimens. These results indicate that the ecological conditions have important impact on the biosynthesis of alkaloids in this plant. This pattern of change can be used to manage the utilization of natural resources and production of medicinal plants.

**Keywords:** Ecophysiology, Pyrrolizidine, Phenolic, Distribution, *Lithospermum*

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**Investigating and Comparing the Antioxidant Potential and Total Phenolic Compounds of Unripe and Ripe Fruit of Caper Plant (*Capris spinosa*).**

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Today, medicinal plants play a very important role in human health. Plants can be considered as a valuable source of a wide variety of secondary compounds. Many medicinal plants contain large amounts of antioxidant compounds, such as polyphenols, which can play an important role in absorbing and neutralizing free radicals [2]. Secondary metabolites play a major role in the adaptation of plants to the environment and in overcoming stress conditions [3]. Caper (*Capparis spinosa* L.) belongs to the Capparaceae family native to the Mediterranean region. *C. spinosa* is a perennial crop one of the most common aromatic plants that grow along the roadside, on the slopes, rocky and stony area and generally well adapted to dry areas basin. The purpose of this study was to investigate and compare the antioxidant potential of unripe and ripe fruits of the Caper plant using DPPH (1, 1-Diphenyl 2-picryl-hydrazyl) assay and Total phenolic compounds was measured Folin-Ciocalteu method. The results showed that the antioxidant potential of the unripe fruit was  $42.25 \pm 13.1$  of  $\mu\text{mol trolox}$  equivalent per gram of dry weight and in ripe fruit was  $15.97 \pm 47$   $\mu\text{mol trolox}$  equivalent per gram of dry weight. Also, the amount of phenolic compounds, is equal to  $1.038 \pm 0.013$  and  $0.655 \pm 0.222$ , mg of gallic acid equivalent per gram of dry weight of the plant, respectively. The findings show that the antioxidant activity of this unripe fruit is much higher than its ripe fruit.

**Keywords:** *Capris spinosa*, antioxidant, DPPH, Folin-Ciocalteu

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**Comparative Study of Quantity and Quality Changes in the Essential Oil of *Mentha piperita* L. under Soil Cultivation, and Ebb and Flow System.**

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Considering the rainfall reduction in the country and the lack of water as well as optimizing the water consumption for cultivation and production of *Menthapiperita* L (Peppermint). as a multifunctional medicinal plant, application of hydroponic system decrease the water consumption with increasing the plant biomass. Peppermint oil is an important essential oil which possesses strong antibacterial and antifungal activities, and has anti-inflammatory and anti-tumor effects [1]. Ebb-and-flow subirrigation is a closed system that applies water to the bottom of the containers, reducing water and nutrient losses due to recirculation of fertilizer solution [2]. This experiment was carried out in a T-test with two methods of cultivation medium consist of ebb and flow system as a kind of hydroponic system, and soil cultivation with three replications under completely controlled conditions in a research greenhouse. The results of the experiment showed that the amount of essential oil in the peppermint plant was significantly ( $p \leq 0.05$ ) affected by the cultivation methods. Maximum content of essential oil (0.241%) was related to ebb and flow system and the lowest value (0.161%) was associated to soil cultivation. Also, GC/MAS analysis of the essential oil showed that the essential oil composition was menthol, menthyl acetate, menthofuran, menthone, neo-menthol and limonene in the both cultivation methods. Meanwhile, menthol (32.55%), menthyl acetate (21.08%), menton (5.16%), neonmentol (4.62%), and limonene (3.72%) were the highest content in ebb and flow method and the highest amount of menthofuran (29.94%) was obtained in the soil cultivation method. In the both of cultivation method the Oxygenated Monoterpenes, Monoterpene Hydrocarbons and sesquiterpene were the main groups of secondary metabolites. Generally, the production of peppermint in ebb and flow method will be appropriated for optimization in quantity and quality of essential oil of *Mentha piperita* L.

**Keywords:** Ebb and flow system, *Menthapiperita* L., Hydroponic system, Menthol, Menthone

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## Effect of Compost Fertilizer and Salt Stress on the Antioxidant Properties of the *Lippia citriodora*.

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The *Lippiacitriodora* which is belongs to the Verbenaceae family, is a shrub and medicinal plant of Iran. Given the common use of compost in agriculture, forestry, landscaping and environmental restoration, it is essential that it is perfectly compatible with plant growth and, if possible, that it increases production and quality of plant biomass. Salinity reduce water potential, thereby restricting water and nutrient uptake by plants. Salinity may also cause ionic imbalance and toxicity. Salt stress is a major abiotic stress of plants in many areas of the world due to increasing use of poor quality of water for irrigation and soil salinization. Under saline conditions, plants have to activate different physiological and biochemical mechanisms in order to cope with stress. In this research, a total of 18 pots were planted in a greenhouse. The plants were treated with three levels of compost (0, 10 and 30% volume of pots) and a two level of salinity (0 and 70 mM). The results showed that salinity increased antioxidant of *L. citriodora*.

**Keywords:** Compost, *Lippiacitriodora*, Antioxidant, Salinity stress

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## Total Reducing Capacity and Free-Radical Scavenging Potential of Two Medicinal Plants *Aloysia citridorn* and *Echinophora platyloba*.

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Medicinal plants are of great importance to the health of individuals and communities. For many reasons, there has been growing tendency towards the use of medicinal plant in recent years. The medicinal value of these plants lies in some chemical substances that produce a definite physiological action on the human body. The most important of these bioactive constituents of plants are alkaloids, tannins, flavonoids, and phenolic compounds [1]. With respect to presence of phytochemicals with antioxidant potential in medicinal plants, screening of these plants with high reducing capacity can be required [2]. In the present study, free radical scavenging potential and total reducing capacity of the methanolic extract of two medicinal plants, *Aloysia citridorn* and *Echinophora platyloba*, by using DPPH and Folin-Ciocalteu methods were determined, respectively. Free radical scavenging capacity expressed as  $\mu\text{mol Trolox g}^{-1}\text{D.W.}$  in leaves and flowers of *Aloysia citridorn* were  $132.03 \pm 4.6$  and  $403.27 \pm 2.5$ , respectively. The amount of this potential in leaves and flowers were  $47.42 \pm 2.6$  and  $32.3 \pm 0.1$ , respectively. Besides, total reducing capacity in leaves and flowers of *Echinophora platyloba* were measured  $1.71 \pm 0.04$  and  $4.51 \pm 0.08$  mg gallic acid  $\text{g}^{-1}\text{D.W.}$  Whilst the same parts in *Echinophora platyloba* had  $0.94 \pm 0.2$  and  $0.4 \pm 0.05$  mg gallic acid  $\text{g}^{-1}\text{D.W.}$ , respectively. To conclude, the ability of different parts of plants to scavenge the free radical is extremely variable. *Aloysia citridorn* particularly its flowers have considerably antioxidant potential as compared to *Echinophora platyloba*.

**Keywords:** Medicinal plant, Antioxidant, DPPH, Folin-Ciocalteu

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## Histochemical Studies of Alkaline Phosphatase Activity in Testes of Rats Following Nicotine and Alcoholic Extract of *Achillea Millefolium* Administration.

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Nicotine as an alkaloid is a very important constituent of the cigarette smoke and *Achillea millefolium*, a widely distributed therapeutic plant, is highly regarded for pharmaceutical activities, due to its antioxidant and anti-inflammatory properties. The present study was carried out to evaluate whether *Achillea millefolium* inflorescences alcoholic extract could serve as a protective agent against tissue damages during nicotine treatment in a rat model. For this study 25 adult rats were divided into five groups each with 5 rats. Two groups were received nicotine at rate of 0.2 and 0.4 mg/kg BW/day respectively by IP route. The other two groups were received nicotine at rate of 0.2 and 0.4 mg/kg-BW/day by IP route along with *Achillea millefolium* alcoholic extract at a rate of 120 mg/kgBW/day through oral route respectively for 48 days. A vehicle treated control group was also included. Animals were euthanized by CO<sub>2</sub> exposure in a special device 24 h after the last treatment. Testes were quickly dissected out, cleared of adhering connective tissue. The testicular tissue processed through routine tissue preparation and stained by alkaline phosphatase technique. In the control group, seminiferous tubules haven't showed a significant amount of activity of alkaline phosphatase enzyme, while in the low and high dose groups receiving nicotine, they were quite evident in the increased activity of alkaline phosphatase enzyme. In groups that had received the low and high dose of nicotine along with *Achillea millefolium*, reduction in alkaline phosphatase enzyme activity have observed in comparison to groups that only had received nicotine. The results of this study suggests that nicotine leads to damages to testicular tissue whilst, the *Achillea millefolium* exerts ameliorative effects against such damages [1].

**Keywords:** *Achillea millefolium*, Alkaline phosphatase, Testes, Nicotine

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## Structure Elucidation of Terpenoids Using NMR Spectroscopy.

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An abeo-abietanediterpenoid, 19(4→3)-Abeo-11, 12, 14-trihydroxy-4(18),8,11,13-abietatetraen-7-one; 12-methyl ether was isolated from DCM extract of roots of *salvia hydrangea*. Two ursane type triterpenoids including 3β-acetoxy-urs-12-ene-1β, 2α, 11α, 20β- tetraol and 3β-acetoxy-urs-12-ene-2α, 11α, 20β-triol were isolated from DCM extract of *salvia grossheimii* aerial parts for the first time. Finally, from a marine sponge, *Ircinia* species, collected from the Persian Gulf's water, three cytotoxic furanosesquiterpenoids have been purified. In this paper, I will describe the structure elucidation of the isolated compounds using spectroscopy methods including electron impact-mass spectroscopy (EI-MS), <sup>1</sup>H NMR, <sup>13</sup>C NMR, and 2D NMR spectra.

**Keywords:** Lamiaceae, Abietanedi terpenoids, Sesquiterpenoid, *Ircinia*, Marine Sponge

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## Effect of Different *Agrobacterium Rhizogenes* Strains on Hairy Root Induction In *Atropa belladonna*.

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*Atropa Belladonna* is a herbaceous and perennial plant belong to Solanaceae family; Its geographic distribution is in Europe; Turkey and Iran. It is rich in valuable phytochemical compounds of the tropane alkaloids, such as atropine, hyoscyamine and scopolamine, which have been shown to have a significant pharmacological effect on the nervous system and have sedative and anti-seizure effects. These secondary metabolites (SMs) accumulate in the plant roots. By biotechnological methods like hairy root culture can reach high amount of these metabolites. Therefore selection of an effective *Agrobacterium* strain for the production of hairy root (HR) that is first step of this process is highly plant species dependent and must be determined empirically. The aim of the present study is to investigate the transformation efficiency of different *A. rhizogenes* strains for the induction of transgenic HRs in *A. belladonna*. HRs have been obtained that overexpress the genes coding for the two key enzymes involved in the biosynthesis of tropane alkaloids, N-methylputrescine transferase (PMT; EC 2.1.1.53) and hyoscyamine-6β-hydroxylase (H6H; EC 1.14.11.11). Wild-type *A. rhizogenes* A4 and engineered strains PMT and H6H were used to infect the plant leaf through needle. The results showed varied infection frequency (IF) and emerging time (ET). Among the *A. rhizogenes* strains H6H had most IF (93.88%). Whereas the strain A4 and PMT had comparatively lower IF (66.6%). Also H6H had most formation rate. ET in A4 was 5 and 9 days earlier than PMT and H6H, respectively. These induced HRs provided a useful material for further research works like HRs cultures for enhanced production of valuable tropane alkaloids of *A. belladonna* on a large scale.

**Keywords:** *Atropa belladonna*, Solanaceae, *Agrobacterium rhizogenes*, Hairy root culture

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**Morphology and Growth Index of Transformed Hairy Roots of *Atropa belladonna*.**

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*Atropa belladonna* (Solanaceae), native to the central and southern Europe, contains different tropane alkaloids (TAs) such as atropine, hyoscyamine and scopolamine. TAs are known as economically important plant-derived drugs, which possess anticholinergic and spasmolytic properties; they are commonly used as an anaesthetic and spasmolytic and in eye surgery.[1]. TAs are specifically synthesized in the roots of the plant thus hairy root (HR) culture is a promising technology for obtaining valuable plant-specific metabolites. For the success in the production of secondary metabolites in HR cultures, investigation of the characteristics of HR lines as the first and the most important step is highly recommended. For instance and in the present work, HRs of *A. belladonna* were established by infecting the leaves with two *Agrobacterium rhizogenes* strains containing N-methylputrescine transferase (PMT; EC 2.1.1.53) (*PMT*) and hyoscyamine-6 $\beta$ -hydroxylase (H6H; EC 1.14.11.11) (*H6H*) genes that coding two key enzymes involved in the biosynthetic pathway of TAs; Each line excised and transferred to half strength Murashige and Skoog (MS) medium for one month and morphological characteristics and growth index (GI) of HRs were then evaluated and the superior lines were selected for further experiments. Results showed varied GI and morphological characteristics in both type of root lines. The most GI was 7.89 (line P4) and 7.66 (line H10) in *PMT* and *H6H*; respectively. The *PMT* and *H6H* lines had different morphological types (highly callus like morphology to completely hairy root like). Our findings can be used for further improvement and scaling up in bioractors for the production of TAs.

**Keywords:** *Atropa belladonna*; Solanaceae, *Agrobacterium rhizogenes*, Tropane alkaloids.

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**Effect of Seed Priming on the Germination Properties of Indian Mustard (*Brassica Juncea L.*) under Drought Stress.**

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Priming is an effective method to improve seed viability that might be resulted to increase of seed germination percent and germination rate under stress conditions, such as drought stress. So, in this research the effect of seed priming on seed germination characteristics of Indian mustard were evaluated under drought stress. A factorial experiment based on randomized complete design with three replications was carried out at Tabriz University. Treatments were priming at three levels (unprimed, and priming with spermidin 1mM and putrescine 1 mM) and drought stress at four levels (0, -2, -4 and -6 bar). result of analysis of variance showed that interactions of drought stress and seed priming has significant effect on germination percentage, germination rate, seedling vigor index, root length, shoot length, shoot/root ratio, and dry weight. Results showed that decrease in water potential of the PEG solution reduced germination percentage, germination rate, seedling vigor index, root length, shoot length, shoot/root ratio, and dry weight and effects of drought stress on growth parameters decrease with priming spermidine and putrescine significantly. These results suggest that treatment polyamines with put and especially spd can considerably reduce some of the harmful effects of drought stress on Indian mustard.

**Keywords:** Priming, Mustard, Germination, Drought stress, Polyamines

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## Evaluation of Water Use Efficiency on Basil with Using Organic Inputs

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In order to improve the yield of Basil plant using Biochar, Azotobacter and Vermicompost, a factorial experiment was conducted in a completely randomized design in May 2009 in greenhouse of Islamic Azad University, Karaj, Iran, in three replications. The factors involved in this experiment were biochemical at 3 levels (0, 15 and 30 percent w/w) and Azotobacter in 2 levels (consuming and not consuming) and Vermicompost at 3 levels (0, 15 and 30 percent w/w). Characteristics such as Total water use efficiency, leaf water use efficiency, stem water use efficiency. The results indicate that the use of vermicompost, biochemical and azotobacter has improved the water use efficiency of basil plant, and has a significant role in improving water use efficiency. The highest total water use efficiency was related to 30% vermicompost and vermicompost and Azotobacter (3.88 g /l), as well as biochemical 30% and vermicompost 15% (3.70 g /l), and the least amount of this indicator Related to the witness.

**Keywords:** Water use efficiency, Biochemical, Vermicompost, Azotobacter, Basil

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## Evaluation of some Quantity Factors on Basil with Using Organic Inputs.

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In order to improve the yield of Basil plant using Biochar, Azotobacter and Vermicompost, a factorial experiment was conducted in a completely randomized design in May 2009 in greenhouse of Islamic Azad University, Karaj, Iran, in three replications. The factors involved in this experiment were biochemical at 3 levels (0, 15 and 30 percent w/w) and Azotobacter in 2 levels (consuming and not consuming) and Vermicompost at 3 levels (0, 15 and 30 percent w/w). Characteristics were measured such as Fresh yield, leaf yield, number of stems, number of leaves, dry yield. So that the highest fresh yield for untreated treatments with 30% level (10921.27 kg / ha), the highest amount of leaf yield was obtained for untreated treatment with 30% level (1262.70(Kg/ha)), the highest amount of dry matter yield was associated with an untreated treatment with a level of 30% (1866.67(kg /ha)), and in all of these traits, the level of vermicompost was 30% more favorable than other levels And Azotobacter consumption has been better than non-consumption.

**Keywords:** Biochemistry, Vermicompost, Azotobacter, Basil

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## Study on Soil Properties of *Calotropis procera* (Willd) Drayand in Different Natural Habitats of Hormozgan Province.

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*Calotropis procera* (Willd) Drayand. is a shrub or small tree that grows and spreads wild along south of Iran, from Khozestan to Sistan & Baluchestan provinces. It belongs to Asclepiadaceae family and is one of the tropical medicinal plants. *C. procera* acts as a purgative, anthelmintic, anticoagulant, palliative (in problems with respiration, blood pressure), antipyretic, and analgesic, and induces neuromuscular blocking activity. The study of the relationship between soil and plant can be found and used to properly manage and adapt ecological principles. In this study, three soil samples from each *C. procera* natural habitat in Hormozgan province, including Parsian, Bandar-Khamir, Bastak, Bandar-Abbas, Minab and Jask, were collected from 0 – 30 cm depth and transferred to the laboratory for the following analyses: soil texture, pH, electrical conductivity (Ec), CCE, SAR and exchangeable mineral nutrients. Soil analysis revealed that *C. procera* grows on habitats with a basic soil reaction (pH 7.1 – 8.9). It seems that this species can tolerate high contents of sodium (30 – 500 ppm), chlorine (32 – 901 ppm) and calcium (3.6 – 262.8 mg kg<sup>-1</sup>) ions. Therefore, in relation to the above mentioned soil characteristics and also with respect to the electrical conductivity (4.2– 68.3 dS m<sup>-1</sup>), SAR (6.1 – 35) and HCO<sub>3</sub><sup>-</sup> (1.6 – 3.6 meq L<sup>-1</sup>) contents of the soil, *C. procera* shows a wide range of occurrence, especially can grow under high salt stress.

**Keywords:** *Calotropis procera*, Soil properties, Natural habitat, Hormozgan province

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## Evaluation of Anti-Neoplastic Activity of Leaf extract of *Cucumis sativus* Linn.

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Tumor is one of the most pervasive diseases in the developed world. N-Nitrosodiethylamine (NDEA) is a potent hepatocarcinogenic nitrosamine present in tobacco smoke, water, and various food stuffs such as milk products, meat products, salted fish, fried meals, soft drinks and alcoholic beverages. Traditional medicines have played a vital role in the progress of numerous clinically useful anti-neoplastic agents and have a long antiquity in the treatment of cancer. *Cucumis sativus* Linn leaves were dried, powdered and successively extracted in Soxhlet apparatus for 72 hours with petroleum ether (60-80°C) and ethanol and the extracts were subjected to preliminary phytochemical screening. Ethanol extract of *Cucumis sativus* (EECS) was subjected to *in vivo* studies. Male wistar albino rats (48) 130-150g were divided into 6 groups such as Group 1: animals served as normal control, Group 2: EECS 200mg/kg/day + 0.5% CMC, Group 3: EECS 400mg/kg/day + 0.5% CMC, Group 4: NDEA alone, Group 5: NDEA + EECS 200 mg/kg/day, Group 6: NDEA + EECS 400mg/kg/day, treatment with extract was started 1 week prior to NDEA injection. Blood and plasma samples were collected, and tumour markers and biochemical parameters were estimated. Ethanol extract of *Cucumis sativus* Linn leaves was found to be rich in flavonoids, phenolics and triterpenoids. This study recommends that EECS possesses a significant protection against NDEA-induced liver carcinogenesis. Since flavonoids, phenolics and tannins were reported to have antioxidative activity, their existence might be involved in chemoprevention against NDEA-induced hepatocarcinogenesis. Therefore, it may be concluded that the ethanol extract of *Cucumis sativus* Linn leaves was able to antagonize the NDEA-induced liver cancer. The antineoplastic action may be attributed to the presence of phytochemicals present in this plant.

**Keywords:** Hepatocarcinogenesis, Phytochemicals, Cancer, N-Nitrosodiethylamine

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## Comparison of Phenolic, Flavonoid and Antioxidant Effects of Lavender (*Lavendula angustifolia*) and Melissa (*Melissa officinalis*) Using two Methods of Softening of the Powder (the Liofilacea and Dried Plant Powder).

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Human beings have long viewed plants in addition to oral vision with therapeutic insights. Plants are a rich source of phenolic compounds (flavonoids, anthocyanins, tannins), which are the most important natural antioxidants. Antioxidants in the diet are important in protecting the body against free radicals in oxidative stress. Lavender and melissa are from the herbs of the Labiatae. Lavender is a plant with a very pleasant smell and a bitter taste. The effects of lavender on depression, anxiety and anti-inflammation, cholinesterase inhibitors, antinociceptive, antiemetic, gastroesophageal reflux disease, blood flow enhancer, anticancer effect. Herbal melissa is a herbaceous, and herbal remedy. The most commonly used therapeutic properties include sedation, antioxidant, antispasmodic, anti-inflammatory, antiviral, anti-inflammatory. These two plants are rich in phenolic compounds, which are the most important natural antioxidants. In this study, ethanolic, aqueous and methanolic extracts of these two plants were prepared by soaking (dried powdery and Liofilacea plant powder) in phenolic and Flavonoid assay with the method of folin ciocalteu and Aluminum chloride, anti-oxidant activity by FRAP and DPPH. the results were compared. the highest levels of phenol and flavonoids were found in ethanolic extract of Lavender. phenol is (14±0.04) and flavonoid is (17.085±0.011) mg/gDW in Liofilacea plant powder. the highest antioxidant activity is the ethanolic extract of Melissa (13.58±0.036) µm/L was obtained by anti oxidant FRAP assay in Liofilacea plant powder. the comparison of phenol and flavonoid with antioxidant effect was shown it is likely that other antioxidant compounds than phenol in these two plants should be present. Because the ethanolic extract of Melissa, which has the best antioxidant effect fewer phenol and flavonoid compounds than ethanolic extracts of Lavender. To achieve certainly, other antioxidant measures such as DPPH done. water extract of Melissa by (IC50=0.016) and ethanolic extract for this by (IC50=0.099) is best Liofilacea powder. the combination of phenol and flavonoids and the antioxidant produced from liofilacea powders of both plants is better than simple powder extracts.

**Keywords:** Phenolic compounds, Antioxidant activity, Flavonoids, FRAP, DPPH

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## Ethnobotanical Study of two Woody Plant in Mazandaran Province (N Iran).

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Ethnobotanical studies provide an important information about medicinal usages of plant in the indigenous areas. In the course of about 15 years ethnobotanical investigation in different parts of Mazandaran province, valuable data in the field of medicinal usage of native plants has been collected. In this paper medicinal usage of two woody plant is presented. *Juniperus excelsa* M. B. is a gymnosperms shrub or tree belong to the family Cupressaceae. Indigenous people of chahardangeh rural district use the ash of young foliage with scale like leaves of the plant in treatment of the ringworm caused by parasitic fungus. *Parrotia persica* (DC.) C. A. Mey. From the family Hamamelidaceae is a subendemic tree in the deciduous hyrcanian forest. Indigenous people of Aghmashhad village used the bark of this plant for treatment of skin injuries of horse. Moghadam *et al.* assessed the potential of *P. persica* in wound repair by analyzing the regenerative effects of its two main phenolic compounds, myricetin-3-O- $\beta$ -rhamnoside and chlorogenic acid. There is a report in the antibacterial activity of methanol leaf extract of *P. persica*. The usage of bark of *P. persica* for Healing the wound in domestic animal (Horse) has been reported for the first time.

**Keywords:** *Parrotia persica*, *Juniperus excelsa*, Ethnobotany, Wound

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## Effect of Compost Fertilizer and Drought Stress on *Rosemary* Antioxidant.

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The general public uses medicinal plants to prevent and treat many diseases. Recently, research on medicinal plants has been considered by researchers for their antioxidant properties, which can be considered as effective factors in improving human health. *Rosemary* is a medicinal plant contains essential oils, tannins, flavonoids, organic acids, terpene and di-terpenes. Plants reduce the reactive oxygen species through antioxidant enzyme and non-enzymatic mechanisms. The use of biological fertilizers such as compost could increase the amount of active ingredient and growth of medicinal plants. Given the common use of compost in agriculture, forestry, landscaping and environmental restoration, it is essential that it is perfectly compatible with plant growth and, if possible, that it increases production and quality of plant biomass. Drought stress is characterized by reduction of water content, diminished leaf water potential and turgor loss, closure of stomata and decrease in cell enlargement and growth. In order to investigate the effect of compost and drought stress, the experiment was conducted in the form of nine levels consisting two levels of compost and two levels of dryness and a combination of them, each with three replications. Antioxidant was measured by the 2, 2-diphenyl-1-picrylhydrazyl method and growth by fresh weight measurement. The results showed that 10% compost had more effect on antioxidant growth than 30% compost. Also, 9 day drought stress had more positive effect on antioxidant properties than 5 days drought. Compost and drought could be used for increasing antioxidant of *Rosemary* to be better medicinal plant.

**Keywords:** Compost, *Rosemary*, Antioxidant, Drought stress

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**Total Phenolic Content, Antioxidant Activity and Morphological Characteristics Changes in *Althaea officinalis* Plants Exposed to  $\gamma$ -Irradiation.**

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Irradiation has been increasingly recognized as an effective decontamination technique that ensures the chemical and organoleptic quality of medicinal plants. *Althaea officinalis* belongs to family Malvaceae. It is one of the medicinal plants used therapeutically since ancient time. The leaves of the *A. officinalis* plant as well as the root are used as medicine. In this study seeds of *Althaeofficinalis* were exposed to different doses of  $\gamma$ -radiation (0, 10, 15 and 20 Gy). After germination of seeds total phenolic content and DPPH radical-scavenging activity of their methanol extracts were investigated and compared by Duncan test. The content of total phenolics in the extracts was determined spectrophotometrically according to the Folin-Ciocalteu procedure and calculated as gallic acid equivalents (GAE) per gr extract. According to the obtained results, the highest phenolic content was observed in the plant treated with 15 Gy, with the value of 35.68 mg GAEs/gr extract. Nevertheless, there was no significant difference in the effect of radiation dose on the phenolic compounds of the plant. The antioxidant activity was determined by an improved assay based on 1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging method. The data were analyzed by SPSS 16.0 software and by Duncan test. According to the obtained results, the plants treated by 15 Gy showed significantly ( $p < 0.05$ ) highest amount of radical scavenging activity with the average of 13.63%. The leaf length and leaf width decreased in plants treated by 10 Gy and 15 Gy doses, respectively. However, these differences were not statistically significant.

**Keywords:**  $\gamma$ -irradiation, Phenolic content, Antioxidant, *Althaeofficinalis*

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**Zearalenone Remediation from Rumen Fluid by *Zataria multiflora* -HPLC base Activity Profiling.**

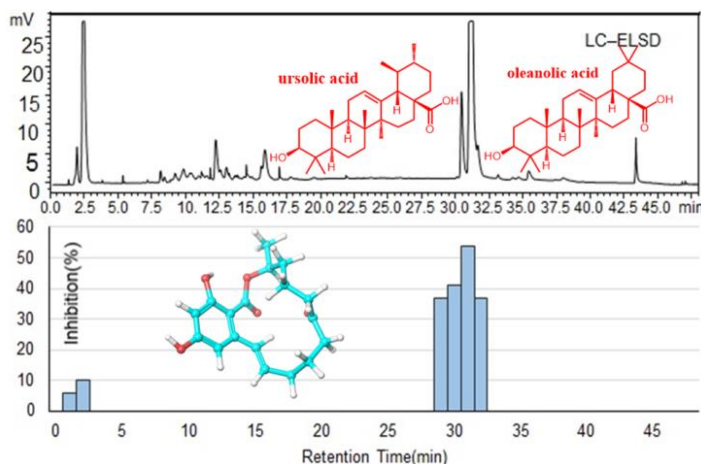
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Zearalenone (ZEA) is one of the most prevalent mycotoxins that usually find in wheat and corn seeds [1]. Detoxification potential of twenty-four plants extracts from Lamiaceae family were evaluated in three concentrations (0.5, 1 and 2 mg/ml<sup>-1</sup>). The assay carried out using rumen fluid, and ZEA-content and results were analyzed by HPLC equipped by fluorescence detector (HPLC-FLD). The data showed that *n*-hexane and methanol extracts of *Z. multiflora* could considerably reduce ZEA 63 and 78% from rumen fluid, respectively. The phytochemical responsible for elimination of ZEA in MeOH extract was localized by HPLC based activity profiling. The phytochemicals were identified by using HPLC-ELSD-MS technique and comparing data with literature values. The compounds in active zone were identified to be triterpenes such as ursolic acid and oleanolic acid.

**Figure 1:** HPLC-ELSD chromatogram and overlay with activity profile of *Z. multiflora*



**Keywords:** Zearalenone, Remediation, *Zataria multiflora*, HPLC profiling, Triterpenes

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## Evaluation of Antioxidant Activity of some Ecotypes of *Smyrniium cordifolium* Boiss. Essential Oils of Root in the Southwest of Iran.

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*Smyrniium cordifolium* Boiss, from Apiaceae family, which has a species in Iran and has the wide spread distribution in the west and southwest of Iran, with antibacterial properties as well as in traditional medicine as diuretics and antilithic effects. In this research, the antioxidant activity of root essential oil was investigated in ten vegetation regions of southwest Iran. Samples were collected from Chaharmahal and Bakhtiari, Kohgiluyeh and Boyer-Ahmad provinces at the full flowering stage. After drying them in shade, their essential oils were culled using a Clevenger apparatus, and then the antioxidant activity of the essential oil of smyrniium root with the use of 2 and 2 diphenyl-1- hydrazil-picyrilide (DPPH) method was based on the percentage of free radical inhibition. The highest antioxidant activity was obtained from Shah Qasem dam ecotype with IC50 value 0/33 µg/ml and the lowest antioxidant activity was obtained from Mahmoud Abad ecotype with IC50 value 8/59 µg/ml. The results showed that essential oil of *Smyrniium* had high antioxidant activity and the difference in antioxidant activity among ecotypes was influenced by plant climate [1, 2].

**Keywords:** *Smyrniium*, Antioxidant activity, Apiaceae

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## Effect of Hydroalcoholic Extract of *Cydonia oblonga* Miller Leaf on Doxorubicin-induced Cardiac Injury in Rat.

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Doxorubicin is one of the most common drugs for chemotherapy. The complications of doxorubicin are cardiac toxicity due to oxidative stress. *Cydonia oblonga* Miller leaf (COL) contains flavonoids and phenolic antioxidants. Due to the presence of antioxidant compounds in COL, the aim of this study was to evaluate the effect of hydroalcoholic extract of COL on doxorubicin-induced cardiac injury in rat. In this experimental investigation, 32 male Wistar rats were divided into 4 groups: control, control under treatment of hydroalcoholic extract of COL, doxorubicin and doxorubicin under treatment of hydroalcoholic extract of COL. In under treatment groups, 200mg/ kg of hydroalcoholic extract of COL was injected intraperitoneally one hour after the first dose of doxorubicin for 2 weeks and administered daily. For induction of cardiac toxicity, doxorubicin was injected at dose of 15 mg/kg intraperitoneally. After two weeks of treatment, the rats were anesthetized with diethyl ether and their heart was removed. After homogeneous tissue was prepared, oxidative stress markers (malondialdehyde, catalase, glutathione) was measured using specific kits. The results were analyzed using one way ANOVA test in Sigmastat software V. 3.5. The results of this study demonstrated that doxorubicin increased malondialdehyde and reduced glutathione and catalase activity in the cardiac tissue of rats. Two weeks of treatment with hydroalcoholic extract of COL reduced the malondialdehyde level and increased glutathione significantly. The increase in catalase activity was not statistically significant. According to the results of this study and the results of previous studies COL with phenolic and flavonoid compounds and antioxidant activity seems to improve lipid peroxidation and oxidative stress in doxorubicin induced cardiac toxicity.

**Keywords:** Doxorubicin, *Cydonia oblonga* Miller leaf, Cardiac toxicity, Oxidative stress



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## Role of Arbuscular mycorrhizal Fungi on the Photosynthetic Pigments of *Rosmarinus officinalis* Plants

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Plant growth and productivity is adversely affected by nature's wrath in the form of various biotic and abiotic stress factors. Water deficit is one of the major abiotic stresses, which adversely affects crop growth and yield. AMF can significantly improve resistance of host plants to varied biotic and abiotic stresses. The present investigation was undertaken to evaluate the physiological responses of Rosemary plants to inoculation with arbuscular mycorrhizal fungi (*Funnelliformis mosseae*, *Rhizophagus irregularis* compared with non-inoculated control treatment) under different irrigation levels (irrigation at 75% FC, 50% FC and rainfed as well-watered, moderate stressed and severe stressed condition, respectively). The 2-year (2015-2016) factorial experiment was conducted based on a randomized complete block design with three replications at Urmia University (latitude 37°33'09" N, 45°05'53" E and 1362 m above sea level). Total chlorophyll and carotenoid of rosemary plants was the same and minimum for all irrigation and non-mycorrhizal treatments. Chlorophyll content (*a*, *b* and total) increased by application mycorrhizal fungi, positively. The use of "*R. irregularis*" had a significant role in modifying this increase. The highest carotenoid (0.18 mg/g FW) was obtained from well-watered plants inoculated with "*F. mosseae*" in second year. Nonetheless, no significant differences between mycorrhizal and non- AMF inoculated plants were observed in first year.

**Keywords:** Arbuscular Mycorrhizal Fungi, Carotenoid, Chlorophyll, Stress

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## Effects of Non-Chemical Weed Management Using Cover Crops in *Nigella sativa* Production.

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*Nigella sativa* (Family Ranunculaceae) is an annual plant widely used medicinal plant throughout the world. Weeds are one the most important limiting factors to reduce the quality and quantity of medicinal plants yield. *Nigella sativa* is a relatively open plant canopy and slow growth, especially at early growth. Thus, weeds can severely decrease the crop yield if the control is not performed satisfactory. In medicinal plant production, chemical control of weeds is not recommended and weeding increase the production costs. Using cover crops is one of the best method to non-chemical weed management and information about this method is very scarce. Therefore, the aim of this study was to investigate the effects of cover crops on *N. sativa* production. An experiment was conducted as completely randomized block design with three replications and six treatments at the research farm of Aburaihan campus, University of Tehran during growing season of 2017. Treatments were weed free (T1), weed infested (T2), barley as cover crop with cutting after *N. sativa* establishment (T3), barley as cover crop with cutting before barley flowering (T4), clover as cover crop with cutting after *N. sativa* establishment (T5), clover as cover crop with cutting before clover flowering (T6). Results indicated that treatments were significantly differed in plant height of *N. sativa*, 100 days after planting. The highest and the lowest plant height were observed at T5 (47.27 cm) and T4 (8.5 cm). Plant height of weed free and weed infested treatments were 47.27 and 19.73 cm, respectively. Plant dry matters of *N. sativa* were also significantly changed at the treatments; the highest dry matter was belonged to T1 with 457.6 gm<sup>-2</sup> which it had not significantly difference with T5 (430.4 gm<sup>-2</sup>). The lowest plant dry matter was observed at the T4 (51.2 gm<sup>-2</sup>) and T2 (62.4 gm<sup>-2</sup>). T1 and T5 had the highest leaf area index with 0.57 and 0.53, respectively. The lowest leaf area index was belonged to T4 (0.05). In general, clover as cover crop with cutting after *N. sativa* establishment was the best treatment and it had not significantly difference with weed free treatment.

**Keywords:** Medicinal oil, Competition, Medicinal plant, Weed density

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## Effects of *Glomus caledonium* Fungus on Essential Oil Composition in *Satureja bachtiarica* at Full Flowering Stage.

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The genus of *Satureja* with the Persian name of "Marze" consists of 14 species in Iran, 9 of them are endemic. One of these endemic species is *Satureja bachtiarica*. These are annual or perennial semi-bushy aromatic plants that inhabit arid, sunny, stony and rocky habitats. Its strong aromatic odor is due to the presence of volatile oils especially thymol. In this study, effect of *Glomus caledonium* fungus on essential oil composition of *Satureja bachtiarica* at full flowering stage was investigated. The main components of the essential oil of the control plants belonged to borneol (7.81%), carvacrol (50.72%), and caryophyllene (5.73%). *Glomus caledonium* led to high content of carvacrol (54.88%) and Caryophyllene (6.50%) whereas decrease in borneol (7.13%) [1,2].

**Keywords:** *Satureja bachtiarica*, Carvacrol, *Glomus caledonium*

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## Effect of Foliar Application by Iron and Zinc Solubility on Yield and The amount of Photosynthetic pigmentation of Cumin (*Cuminum cyminum L.*) under Field Conditions.

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The micronutrients play a vital role in the development of plants and in terms of their necessity in increasing the yield of the crop. In order to effect the soluble iron and zinc on yield and yield components of cumin in rainfed conditions, an experiment was conducted as split plot in a randomized complete block design with three replications during 2015- 2016 in the Field of Green cumin in Mahan (35 km south-east of Kerman). The treatments were consisted of two levels of irrigation and dry culture were investigated as the main plot and four levels of spraying (zinc, iron, zinc + iron and water spraying) as were studied as subplots. The studied traits were grain yield, 1000 grain weight and stem height and chlorophyll a and b. The results showed that the highest grain yield was obtained from spray application in irrigation cropping conditions of 57.173 and 73.590 kg / ha in the first and second year respectively. The highest 1000 grain weight was obtained from spray application in irrigation crop conditions of 2.89 and 2.9 g, respectively, in the first and second year respectively. The highest plant height was obtained from spray application in irrigation crop conditions of 25.3 cm. The highest amounts of chlorophyll a and b were obtained from dry culture and iron + zinc spraying treatments at 255.85 and 98.77 mg / m<sup>2</sup>, respectively. Provision of low-energy elements especially iron and zinc in drought stress has a special role in plant protection against drought stress. Therefore, the solubility of these elements in drought conditions is a suitable method for improving quantitative and qualitative yields. Another report states that increased zinc concentration in the seed could increase seed vigor and seed placement, especially in areas with zinc deficiency.

**Keywords:** Cumin, Micronutrient elements, Soluble, Yield and Yield Components

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**Effect of Salinity Stress on the Content of some Secondary Metabolites in Rhizomes of two Populations of *Glycyrrhiza glabra* L.**

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*Glycyrrhiza glabra* L. (Licorice) belongs to the Fabaceae family, which considered one of the oldest and most widely used herbs around the world. Rhizomes and tap roots of licorice have secondary metabolites such as glycyrrhizin, flavonoids, phenolic compounds, saponoids. Ecological factors are the dominant factors affecting the secondary metabolites of the plants. Salt stress is a major abiotic stress of plants in many areas of the world due to increasing use of poor quality of water for irrigation and soil salinization. Under saline conditions, plants have to activate different physiological and biochemical mechanisms in order to cope with stress. This study was carried to evaluate the effects of different concentration of sodium chloride on some secondary metabolites in block design and with three replications. For this purpose, rhizomes of licorice collected from two regional growing (Fars and Khorasan razavi), in fall 2016. Rhizomes were cultivated (with a diameter of 1 cm and a length of 15 cm) in greenhouse conditions. after 11 months, the plants were treated with different concentrations of sodium chloride (0, 100, 200, 400, 600, 800 mM) for one month. Then, plants were harvested and assayed phenolic compounds, flavonoids and anthocyanins. Results showed that salinity stress lead to increase phenolic compounds, flavonoids and anthocyanin significantly. So that, with increasing concentration of sodium chloride, the content of these secondary metabolites were elevated. Also, the contents of phenolic compounds, flavonoids and anthocyanin in rhizomes of Fars population were more than Khorassan razavi population. Although, Only the interaction between salinity and population was significant in flavonoids content. Therefore, the treatments of salinity (especially 800 mM NaCl) caused to increase some secondary metabolites. One of the most important features of phenolic compounds is antioxidant activity which is closely related to their chemical structure. In conclusion, licorice of Fars population, with increasing secondary metabolites in rhizomes cause to ameliorate salinity stress more than Khorassan razavi.

**Keywords:** *Glycyrrhiza glabra* L., Secondary metabolites, Salinity, Rhizome

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**Investigating Effects of Different Salinity Levels on Germination and Growth of *Dracocephalum moldavica* L.**

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Badrashbu with the scientific name of *Dracocephalum moldavica* L. from Labiatae sp. family is one-year grassy plant which interests in dry conditions originated in southern Siberia and the Himalaya Mountains. Vegetative structure of the active ingredients of this plant is used as alleviator and appetizer and sedative and anti-bacterial properties of its essence is used to treat abdominal pain and bloating. Since germination and seedling stage, one of the important stages in the life cycle of plants, is influenced by various factors including salinity, an experimental study was conducted entitled “effects of different levels of salinity on germination of *Dracocephalum moldavica* L.” in a completely randomized design with three replications and five treatments (0, 50, 100, 150 and 200 mM) at laboratory of Agriculture and Natural Resources Research Center, Kerman, and Finally, the results were analyzed using SPSS software and mean comparison were achieved by Duncan test. Results showed that germination rate and percentage, radicle and plumule length and their wet and dry weight decreased with increasing salinity level. The time needed for germination increased as salinity levels increased.

**Keywords:** Badrashbu, germination, salinity stress, Kerman



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## Evaluation of some Physiological Parameters of *Amaranthus viridis* L. In Sistan Region.

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Recently, research centers pay a lot of attention to medicinal plant because of their special importance in safety of communities. The curative properties of medicinal plant are due to the presence of various complex chemical substances of different composition which occur as secondary metabolites. This research was carried out to determine biochemical parameters of *Amaranthus viridis* L., a medicinal plant belonging to the *Amarantaceae* family, which was collected from the south-eastern of Iran, Sistan region. In this study, carbohydrate amounts were determined by the irri-gon method [1], the amount of photosynthetic pigment was measured by the Lichtenthaler method. Results showed the highest amount of chlorophyll b in leaves (43.04 mg/g green leaves) and seed extracts indicated the highest amount of carbohydrates than leaves and roots in the seed stage. Also, the root extract showed the highest amount of carbohydrates than leaves in the vegetative stage.

**Keywords:** *Amaranthus viridis* L., Carbohydrate, Photosynthetic pigments

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## Essential Oil Composition of some Varieties of Date palm (*Phoenix dactylifera* L.) in Iran.

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Areaceae or palmaceae. In this study, chemical composition of the essential oils from seven cultivars of Date palm, *Phoenix dactylifera* L. (named mosafati, zahedi, halileai, piarom, keroot, mordasangh, medjool) growing in Bam, Iran, were determined by means of gas chromatography (GC) and gas chromatography-mass spectrometry (GC-MS) analyses. Based on the dry weight of samples, the effect of cultivar on the spathe dry matter yield, essential oil yield and essential oil content became significant at a probability level of 1%. Comparing means showed that Piarom, zahedi and mozafati cultivars had the highest essential oil content (0.207%, 0.203%, 0.150%). Seventeen compounds were identified in the essential oils. The main components of this oil were 3,4-dimethoxy toluene, D-methyl anisole and 2,6-dimethoxy toluene.

**Keywords:** 3,4-dimethoxy toluene, D-methyl anisole, 2,6-dimethoxy toluene, Spathe

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## Effect of Foliar Application by Iron and Zinc Soluble on Yield and Percentage Essential Oil of Cumin (*Cuminum cyminum* L.).

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Cumin is one of the most important medicinal plants. The essential oil has an antioxidant property. In order to study the effects of zinc and iron application on the percentage and yield of cumin essential oil under drought stress conditions, a factorial experiment was conducted in a randomized complete block design with three replications in 2015-2016 in the greenhouse of Kerman University of Technology and Advanced Studies (Advanced Science and Technology Technology and Environmental Sciences Research Institute). The experimental treatments included the first factor foliar application of leaf in four levels (zinc, iron, zinc+iron and water spraying), the second factor was drought stress at three levels (30%, 50% and 70% crop capacity). The traits studied in this experiment were the percentage and essential oil yield. The highest percentage of essential oil was obtained from irrigation+zinc treatment at 1.5% field capacity at 50% field capacity. Spraying resulted in a significant increase in the levels of cuminaldehyde, paracymon and myrson, but the levels of alpha-pinene, beta-pinene, gamma-terpinene and 1 and 4-paramenthadine 7-L were reduced by spraying. Cumin essential oil compounds as comonomer aldehyde, cumin, gamma-terpinene, cefranal, paracymon, and betapinone [1]. The main ingredient of the cumin essential oil is 1-4 paramenthadine, cuminaldehyde, gamma-terpinene and betapinone [2].

**Keywords:** Cumin, Essential oil, Micronutrients, Soluble

**References:** [1] Jirovets, L. and Buchbauer. *Ind J of Food Sci Technol.*, **2005**, 40, 101-110.

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## Influence of Different Phenological Stages and Plant Parts on Essential Oil Yield of *h. Rawianum*.

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The genus *Heracleum* belongs to the important family Apiaceae (Umbelliferae), subfamily Apioideae, tribe Peucedaneae, and comprises over 120 species, which are mainly found in temperate areas of the northern hemisphere. In traditional medicine some *Heracleum* species are used as analgesic, antiseptic, diaphoretic, carminative, and digestive agents, and also used as flavouring agents and spices in foods. This genus is represented by eight perennial aromatic species (*H. persicum*, *H. rawianum*, *H. transcaucasicum*, *H. gorganicum*, *H. anisactis*, *H. rechingeri*, *H. antasiaticum* and *H. pastinacifolium*), in the Flora Iranica, often growing wild in margin of the rivers and humid mountain regions. *H. rawianum* is a semi-native species growing in the Sabalan mountain in northwestern of Iran. This study was conducted in order to determine the influence of different phenological stages and plant parts on essential oil yield of *H. rawianum* grown in Meshgin Shahr, Ardabil province, Iran (2595 m above sea level, GPS coordinates: N 38°19' E 47°50'). Different Plant parts were collected during three different stages of growth including vegetative phase in early June (leaves), full flowering phase in late June (flower stalks and flower umbel) and fruit set phase in July (unripe and ripe seeds) in 2017. For extraction of the essential oil, the air dried samples (100 g) was separately hydrodistilled using a Clevenger-type apparatus for 3 hours. There were significant differences among the essential oil contents of different parts of *H. rawianum* at various phenological stages. The yield of essential oil ranged from 0.11% (v/w) in flower stalk sample at full flowering stage to 2.90% (v/w) in unripe seed sample in fruit set stage. Although, there was no significant difference between essential oil content obtained from unripe and ripe seeds (2.66% v/w). During the stage of full flowering, the flower umbel contains high amount of essential oil (0.58% v/w), compared with essential oil yields of leaves (0.38% v/w). The yield of essential oil of leaves sample which collected in Vegetative stage was 0.23% (v/w).

**Keyword:** *Heracleum rawianum*, Essential oil, Phenological stages

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## The Role of Salicylic Acid Application on Flowering of Saffron (*Crocus sativus L.*)

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Saffron (*Crocus sativus L.*) is plant of Iridaceae families which is propagated by corm. salicylic acid is a plant growth regulator that in some of the physiological, biochemical and molecular plant involved. In order to study the effect of salicylic acid hormone on saffron, an experiment was conducted in 2016 at the Research Field of College of Aburaihan, University of Tehran. The experimental design was factorial arrangement in randomized complete block design with three replicates. The first factor consist of salicylic acid in three levels (without application, application in 1 and 2 mM by priming of corms before planting and second factor was size of corm in two level that consist of small corm (3-5 g) and large corm (8-10 g). The traits that study consist of fresh weight of flower, number flower and times to beginning of flowering. Immediately after flowering, fresh weight of flower calculated by balances with 0.001 accuracy. And The number flower counted. Also the times to beginning of flowering in relation to date of sowing was recorded. The results of analysis of variance showed that effect of salicylic acid on fresh weight of flower and times to beginning of flowering wast significant. Also the effect of corm weight on fresh weight of flower wast significant. The results of mean comparison showed that the highest amount of fresh weight of flower, least time to beginning of flowering belong to salicylic acid in 2 mM by 274.60 mg, 42.167 days, respectively. Plant growth regulator is used in all aspects of the plant's vital cycle. As these materials can have a profound effect on the plant's reactions. One of the most important compounds identified in this field is salicylic acid.

**Keywords:** Corm, Priming, Saffron, Salicylic acid

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**Study and Phytochemical Optimization Volatile Compounds *Heracleum Persicum* Fruit with from Supercritical Fluid Extraction.**

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*Heracleum persicum* is Iranian herb. This plant is due to the amount Essential oil Abundant Known as one of the most famous medicinal herbs. In extraction method with supercritical fluid of *Heracleum persicum*. Parameters, pressure, Dynamic time and volume modifier Selected as influential main parameters. Optimum condition Using central composite design at 360 atmospheric pressure dynamic time is 55 minutes and the volume of the modifier 184 microliters, with a yield of 2.85%. Main components of the extract contains compounds, Butyl 2-methylpropanoate, Isobutyl Butanoate, Butyl bethanate, n-Actanal, Isobutyl 3-methylbutanoate, Hexyl ethanate, Para Siman, Cis beta asman, n-Butyl-2-methylbutanoate, Butyl Pentanoate, Alpha terpinene, Linalool, Hexyl isobutyrate, Hexylbutyne, Hexyl butyrate, Acetyl acetate, Hexyl 2-methyl butyrate and Hexyl hexane.

**Keyword:** *Heracleum persicum*, Supercritical fluid, Gas chromatography-mass.

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**Evaluation of Phytochemical Essential Oils and its Antioxidant Activity in *Froriepia subpinnata* as Native Plant of Iran.**

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Essential oils in plants are group of secondary metabolites that commonly used not only in different industries but also in ethnobotanical medicines for centuries. Biosynthesis of essential oils occurs through two complex natural biochemical pathways involving different enzymatic reactions. *Froriepia subpinnata* (Ledeb.) Baill. Is a biennial native plant of the country which grows in lower mountain hillsides, at the altitudes of 900-1000 meters above the sea level, at forest edges and near roads. In the present study, the constituents of the essential oil from aerial parts of *Froriepia subpinnata* (50 g) obtained by hydrodistillation were determined using gas chromatography-mass spectroscopy (GC-MS). Also, the obtained essential oil was assayed for measurement of antioxidant activity (FRAP and DPPH) at a concentration of 300 µg/mL as standard method. Thirteen different components were identified by GC-MS. The major constituents of the essential oil were Pentadecanoic acid (18.8%), 9-Hexadecenoic acid (18.05%) and Phytol (4.21%). The essential oil of *Froriepia subpinnata* exhibited 62.74% and 53.3% antioxidant activity in FRAP and DPPH radical scavenging inhibition respectively. These results showed that essential oil of *Froriepia subpinnata* is promising sources of natural antioxidants and bioactive compounds beneficial used in the food or pharmaceutical industries.

**Keywords:** *Froriepia subpinnata*, GC-MS, FRAP, DPPH

**References:** [1] Rehman, R.; Hanif, M. A.; Mushtaq, Z.; Al-Sadi, A. M. *Food Rev. Int.* **2016**, *32*, 117-160.

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**Effect of Salicylic Acid on Photosynthetic Pigmentation of Saffron (*Crocus Sativus L.*) under Greenhouse Culture Conditions.**

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Saffron is one of the most valuable medicinal plants, which is due to the triploid (3n= 24), so its reproduction is done vegetatively and through daughter corm. Today, compounds are used which causes improvement of metabolic activity of the plant. One of the most important of these compounds is salicylic acid. In order to study the effect of salicylic acid on the physiological and biochemical characteristics of saffron, an experiment was conducted as factorial in a randomized complete block design with three replications during 2016 at the Research Field of College of Aburaihan, University of Tehran. Experimental treatments consisted of the first factor of salicylic acid in three levels (0, 1 and 2 mM), the second factor was two different saffron corms, including small corm (3-5 g) and big corm (8-10 g) and the third factor of the method of application in two levels (Corm priming, Foliar application) were studied. The results showed that the amount of photosynthetic pigments increased with salicylic acid hormone. The highest levels of photosynthetic pigments (chlorophyll a, chlorophyll b, carotenoids were 10.38, 7.8 and 0.9 mg / g fw, respectively), in the hormone method was obtained by foliar application. Salicylic acid, with external application, is involved in some physiological, biochemical and molecular steps in the plant.

**Keywords:** Corm, Corm priming, Foliar application, Salicylic acid

**References:** [1] Hayat, Q., S. Hayat, M. Irfan, and A. Ahmad. A review. *Environmental and Experimental Botany.* **2009**, *68*, 14-25.





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## Antibacterial and Antioxidant Potential of Methanolic Leave Extract of *Buxus Hyrcana*.

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*Buxus hyrcana* is the only Box species in Iran which grown in hyrcanian forest in Northern part of country. The Leave extracts of the species have been used as folk remedy for several diseases, including malaria and venereal disorders. More studies about the *Buxus hyrcana* were taken on the Triterpenoid alkaloids that are anti-HIV agents. Some types of steroidal alkaloids are known in *Buxus hyrcana* and the activity was tested *in vitro* on oxidative burst, chemotaxis, T cell proliferation, and cytokine production. This study was performed to evaluate the biological activities including antibacterial and antioxidant properties in methanolic leave extract of *Buxus hyrcana*. Antibacterial activities of leaf extracts determined against both Gram positive (*Bacillus subtilis* and *Bacillus cereus*) and Gram negative (*Escherichia coli* and *Enterobacter aerogenes*) pathogens. The obtained results showed that leave extracts are active and have appreciable activity against these bacteria at low concentrations. Besides that, the anti-oxidant properties using DPPH and FRAP assays revealed the highest antioxidant activity at concentration of 300 µg/ml crude methanolic extract with respective values of 69.6% and 78.5%. The present research demonstrate that leave extract of *Buxus hyrcana* contained high antibacterial potential and it could be utilized as a natural antioxidant source.

**Keywords:** *Buxus hyrcana*, Antibacterial potential, Antioxidant activity

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## *Cannabis Sativa* Extract Attenuated the Paraquat-Induced Damages on Alveolar Macrophages.

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It has been reported that marijuana and other cannabinoids are actively able to alter the function of various cells including lymphocytes, macrophages and natural killer cells [1]. The Soxhlet extraction was performed on seeds of *Cannabis Sativa* by using Ethanol and a 14-17% yield was obtained. The potential protective effects of prepared cannabis sativa extract (CSE) were studied on the freshly isolated Alveolar Macrophages (AMs) by means of the colorimetric cell viability assay of MTT. The capability of extract on the activity of myeloperoxidase enzyme on the presence of paraquat as a known pulmonary toxic agent was also analyzed. The total antioxidant capacity of PQ-exposed cells in the presence and absence of extract was determined as well. Our findings revealed that the PQ-induced cytotoxicity, which were characterized with the reduction of cell viability and total antioxidant capacity were remarkably and significantly ( $P < 0.05$ ) enhanced. We also found that the PQ-induced MPO activity was declined by concurrent treatment with CSE. Our results suggest that CSE could be useful medicinal remedy for pulmonary inflammations after complete and inclusive pharmaco-toxicological studies.

**Keywords:** Alveolar Macrophages, Cannabis Sativa Extract, Cytotoxicity.

**References:** [1] Yang, Y.; Lewis, M.M.; Bello, A.M. *Cannabis and Cannabinoid Res.* **2017**, *2*, 274-281.

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## Preparation and Characterization of Gellan Gum Wound Dressing Including Aloe Vera Gel and Silver Nitrate.

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The purpose of this research is making a natural, bio-compatible and biodegradable wound dressing with anti-bacterial and repairing or restoring properties. addition to the naturality of this material which decrease the probability of lateral complications for patients, wound dressing maybe produced cheaper. In this study, Hydrology film including Gelan gum based on Aloe Vera gel and Silver nitrate with different weight percents of Aloe Vera gel ( 20, 50, 80 percent) were made by solvent moulding method. Then attraction rate of film's water was evaluated. the results of experiments showed that by increase of weight percent in Aloe Vera to 80%, attraction rate of water increases in sample level or area. Also, Cell toxicity and cohesireness of fibroblast cells L929 over samples area was evaluated through *in vitro* tests and anti-bacterial properties of samples was investigated and evaluated by two positive warm bactery *S.aureus* and negative warm bactery *E.coli*, from tests results, it was seen that increasing the growth and proliferation of cells and anti-bacterial properties was more on sample of Gellan gum based on Aloe Vera gel 80% and in other samples nitrate was seen [1,2].

**Keywords:** Wound dressing, Gelan gum, Aloe Vera gel, Silver nitrate

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**Investigating The Effect of Herbal Essential Oils on Sleep Quality and Reducing Stress.**

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Aromatherapy is one of the complementary therapies used for anxiety and sleep quality in the world. The essential oils of many medicinal plants affect the nervous system by inhalation. In order to investigate the therapeutic effects of herbal essential oils on sleep quality and reducing stress, essential oils of eight herbs were selected to treat the effect of their healing on anxious people. The results showed that the combination of essential oils of lavender, lemon balm, geranium and lemon, which was called a Golaram oil, had the greatest impact on the state of sleep and by increasing amount of lavender essential oil, will have a better effect on sleep quality and reduce stress.

**Keywords:** Aromatherapy, Essential oils, Sleep quality, Stress, Lavender

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**Phytochemical Analysis of *Salvia Compressa***

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*Salvia* (sage) is one the most important medicinal genus of the Lamiaceae family. Many studies on various sage plants have approved some of their biological activities such as cytotoxic, antimicrobial, antiprotozoal, antioxidant, phytotoxic and insecticide effects. The aim of this study is to isolate phytochemicals from *Salvia compressa* and structure elucidation of the purified compounds. The aerial parts of *S. compressa* were extracted by dichloromethane (DCM). After evaporation of the solvent under reduced pressure, the residue was subjected to open column chromatography over silica gel 60 (0.063-0.200 mm particle size) to yield 32 fractions. Similar fractions were combined based on their similarity in compositions, deduced from Thin Layer Chromatography (TLC) analysis with different solvents. Further purification on the resulting fractions have been performed by using impregnated column chromatography, flash column chromatography, preparative TLC plate, analytical and semi-preparative high pressure liquid chromatography (HPLC). The structures of the five isolated compounds were elucidated using spectroscopy methods including <sup>1</sup>H NMR, <sup>13</sup>C NMR, and EI-MS and by comparison of their spectral data with those published in the literature for the authentic samples. Triterpenoid as the chemical markers of the genus *Salvia*, cycloartane triterpenoid, β-sitosterol (steroid), and glycerides with unsaturated fatty acid chains were suggested for the structure of the purified compounds.

**Keywords:** Lamiaceae, *Salvia compressa*, Triterpenoids, Glycerides

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**Effect of Different Concentrations of Salicylic Acid on Traits Corm and Flower of Saffron under Greenhouse Cultivation Conditions**

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Saffron is the most expensive crop on earth. In order to study the effect of salicylic acid hormones and corm weight on quantitative and qualitative traits of flower and corm of saffron, an experiment was conducted as factorial in a randomized complete blocks design with three replications during 2016 at the Research Field of College of Aburaihan, University of Tehran. The treatments consisted of the first factor of salicylic acid in three levels (0, 1, 2 mM), the second factor was two different weights of corm, which included small corm (3-5 g) and big corm (8-10 g) were studied. The studied traits were fresh weight of flower, number and fresh weight of daughter corms. The results showed that the highest fresh weight of the flower (302.7 mg) was obtained in the double interaction of salicylic acid 2 mM in large corm (a3b2). The highest fresh weight of the daughter corms was obtained salicylic acid with a concentration of 2 mM in large corm and the highest number daughter corms in salicylic acid at a concentration of 1 mM in large corm. The use of salicylic acid and cinnitine increases the flowering of the saffron plant.

**Keywords:** Corm, Saffron, Salicylic acid, Yield

**References:** [1] Moein, P., and Mortazaeinezhad, F. *The 1st International Conference on New Idea in Agriculture. Islamic Azad University Khorasan Branch. 26-27 Jan. 2014*. Isfahan, Iran. (In Persian).



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## An Ethnobotanical Investigation on Medicinal Plants used in Treatment of Urinary System Diseases in Char-Dangeh District of Sari.

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Medicinal plants are important element of medical system. Char-Dangeh District is a historical and traditional region situated in center of Mazandaran province in North of Iran. This area is interesting due to Prevalence in traditional usage of plant species by Indigenous people. On the other hand the notice to the natural resources in remedy of disease such as kidney and bladder disorders is necessary now because of their importance on human health. An Ethnobotanical study of plant used for the treatment of these diseases was carried out in the studied area. The study revealed 14 plant species that are used for the treatment of Kidney and Bladder diseases as diuretics or removing agents of urinary stones. These plants belong to 14 genera and 10 families. Asteraceae with 3 species and Brassicaceae with 2 species are the most abundant and important families in this aim. 50% of the plants were used in removing of urinary stones, 28.5% for strengthen and remedy of kidney infections and 14.3% as diuretic agents. Leaves and total aerial parts are the most commonly utilized portions of plants for healing purposes. The methods of preparation often employed are infusions and decoctions. According to our research the significance reduction of Ethnobotanical information has been observed in the studied area. Therefore the comprehensive research surveys in the area are necessary to finding and documenting more useful species.

**Keywords:** Ethno botany, Traditional medicine, Iran

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## Traditional Usages of Medicinal Plants in Remedy of Respiratory Diseases in Sari, Char-Dangeh District (Ethnobotanical Standpoint).

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Traditional Knowledge is so important for development of modern health care systems in the world. Also Char-Dangeh area is an important region located in elevated mountainous regions of Alborz in North of Iran and traditional usage of plant species is commonly observed in this region. While, low information on the traditional application of plants of this region is available now so we are decided to studying in this subject in the area. The results of study revealed 18 plant species that are used for the treatment of respiratory System disease such as Cough, Black cough, Throat and Breast Infection, pneumonia, Asthma and shortness of breath. These plants belong to 17 genera and 14 families. Asteraceae and Plantaginaceae with 4 and 2 species are the most important families respectively. The most commonly utilized portions of plants for medicinal purposes include the leaves, aerial parts and seeds respectively. The methods of preparation often employed are infusions and decoctions. Therefore, based on current findings the indigenous people of the region are well informed about the medicinal properties of local plants and also many of the plants have potential active ingredients to influence on respiratory disease. Otherwise the comprehensive Ethnobotanical survey in the area is necessary to finding more useful species.

**Keywords:** Ethno botany, Traditional medicine, Iran

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## Extraction of Natural Dyes and Its Application for The Diagnosis of Diabetes.

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The purpose of this project is to extract natural dyes, which are able to detect the presence of pathogenic agents in the analyzed analytics, such as saliva, blood, urine, and cerebrospinal fluid by color changes. The sensitivity of this method is very high in detecting pathogens at the molecular level. Therefore, this method is used for early diagnosis of low concentrations of pathogenic agents. Ultimately, these biologically synthesized dyes can be used to make sensors for diagnosis of various genetic diseases such as MS, cancer, Alzheimer's, Parkinson's, diabetes, etc. This method of identifying the disease, is able to improve the patient's quality of life by ability of early diagnosis in a quick and inexpensive way. In this research, Anthocyanin color was extracted from Blackberry fruit. In order to ensure the extracted samples, the absorption spectra were taken and proved that the Anthocyanin was extracted. Then, in order to investigate the effect of pH on the absorption spectra of the samples, Anthocyanin samples were prepared at different pH levels and found that this color is able to use to detect the pH changes in the environment. In the next phase of study, anthocyanin efficacy was evaluated in diagnosis of diabetes. To this end, we used the glucose oxidase enzyme. This enzyme, in combination with glucose, produces gluconic acid and causes the blood pH to be acidic. Anthocyanin and glucose oxidase were added to the healthy and patient blood samples and take the absorption spectra of them. In the next step, FTIR analysis was performed for healthy and patient blood samples. Both analyzes showed that anthocyanin has potential to use as a biosensor.

**Keywords:** Fluorescent labeling, Fluorescent, Bioprobe, Biocolor, Early diagnosis

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## Essential Oil Content and Composition of *Lavandula angustifolia* L. Cultivated in Three Locations of Iran.

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*Lavandula angustifolia* L. (Lavender) has been used as a medicinal plant in anxiety, stress, depression, headaches, migraines, digestion, liver and gallbladder problems. Different bioactive constituents have been suggested to contribute to antifungal activity of this plant. The present study was undertaken to assess genetic diversity in Iranian landraces (cultivated populations) of lavender based on essential oil characteristics. The Lavender seedlings were cultivated in the field conditions in three provinces: Hamadan, Tehran and Khoramabad provinces, Iran during 2016 and 2017. The aerial part of landraces harvested during the full flowering phase. Essential oils were extracted using Clevenger. The constituents of essential oils were analyzed by gas chromatography-mass spectrometry (GC-MS). Essential oil yield of Tehran and Khoramabad populations, was varied from 2.4% to 1.7% (w/w) and 2.1% to 1.2% (w/w) respectively in first and second year, while Hamadan population, had essential oil yield from 2.0% and 2.13% (w/w), respectively. Among tested *L. angustifolia* landraces, Hamadan population showed the highest essential oil content (2.13%). Totally, 25 compounds were identified in essential oils of three populations. The dominant constituent was Linalool in Tehran (49.60%) at the first year compared to Hamadan (38.19%) at the second year. The second major constituent was Linalyl acetate in Hamadan with the highest amount at the both cultivation years 33.6% and 25.36% respectively. Lavandulyl acetate was the third considerable constituent for landraces. The highest Lavandulyl acetate was belonged to Hamadan (11.3%) in the first year in comparison with the second year in Tehran (10.5%). In Tehran and Khoramabad populations linalool concentration has shown a decrease during the two cultivation years, while in Hamadan this component shown high increase from first to second year of cultivation. Linalyl acetate and Lavandulyl acetate content in Tehran has shown increase during two years, but in Hamadan and Khoramabad shown decrease with cultivation year. The present study demonstrated a broad diversity among lavender landraces essential oils from three habitats of Iran. This knowledge could be useful in conservation, germplasm management and breeding programs of *L. angustifolia*.

**Keywords:** Essential oils, *Lavandula angustifolia* L., Cultivated Populations, Linalool

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## The Effect of Thyme Extract on Immune System Parameters of *Acipenser stellatus*.

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Sturgeon (*Acipenser stellatus*) as an important and rare fish generally inhabits in the Caspian, Black and Azov Seas. This species is known as an endangered fish. Thyme (*Thymus vulgaris*) is of the genus *Thymus* with culinary, medicinal, and ornamental uses. The present study was conducted to evaluate the effect of extracts of *Thymus vulgaris* on improving efficiency of *Acipenser stellatus* immune system. Concentrations of 1%, 5% and 10% herbal extract were used in a complete randomized design with three replications. After 60 days, the immunity parameters including WBC, RBC and Hct were recorded. Analysis of variance showed a significant difference between treatments for all traits. Least significant difference (LSD) test revealed that the use of 10% herbal extract was the best treatment for all traits. Generally, it can be concluded that oral administration of *Thymus vulgaris* extracts, especially in 10% concentration cause improvement of immune parameters of *Acipenser stellatus*.

**Keywords:** Sturgeon, *Thymus vulgaris*, Immunity parameters, Feeding

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## Study in Total Phenolic and Flavonoid Content of *Clematis Iranica* Using Different Solvent Polarities.

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*Clematis iranica* Habibi, Ghorbani & Azizian is an endemic plant of Iran which is recently reported as a new species for the first time in the world. This species is distributed in mountainous parts of Alborz in Iran plateau. The genus *Clematis* is a well-known plant in traditional medicine of other countries but the Iranian species of the genus are not commonly used until now. Due to some local usages of the species which confronted during in our Ethnobotanical studies we decide to evaluate the phenolic and flavonoid content of the species. So the aim of this study was defined as description on effect of various solvent extracts of *Clematis iranica*. This study is the first to compare total phenolic and total flavonoid content of aerial parts of plant. The extracts were obtained by hydrolyses extraction method using different solvent polarities consist of Methanol, Hexane, Ethyl-Acetate, Butanol and Water. The highest amount of phenolic content was found in the Methanol extract ( $3.07 \pm 0.15$  mg gallic acid equivalent/g DW) followed by Water (2.29), Ethyl-Acetate, (0.50) Hexane (0.33) and Butanol (0.09) extracts respectively. While total flavonoid contents of Methanol solvent ( $5.66 \pm 0.30$  mg rutin equivalent/g DW) was found significantly higher than other solvents consist of 2.12, 1.51, 1.31 and 0.8 for Hexane, Ethyl-Acetate, water and Butanol extracts respectively. So the data from present study revealed that *Clematis iranica* is a rich natural source of phenolic and flavonoid compounds. But the extraction solvent is more affective on the extracted compound amounts.

**Keywords:** *Clematis iranica*, Endemic Species, Phytochemical investigation, Iran

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## A Comparative Study of Antioxidant Activity in Different Extracts of *Clematis flammula*

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*Clematis flammula* L. is one of the Iranian species of the genus with limited distribution in Iran. This was grown in the polluted industrial soils and so it seems to be resistant species. Antioxidant activity of two other species of Iranian *Clematis* species was investigated. Therefore this one was subjected to study for investigation on the assessment of its Antioxidant potentials. The evaluation and comparison of antioxidant activity in five different extracts (Methanol, Hexane, Ethyl-acetate, Butanol and water) of *C. flammula* using two different methods of DPPH radical scavenging activity and FRAP (Ferric-Reducing-Antioxidant power) was subjected. The potential of the extracts for both methods was determined by Gulcin et al. and Yen and Chen methods. The result showed that the DPPH (IC50 µg/ml) values for plant extracts were 43.92 for Butanol, 75.28 for Ethyl-acetate, 92.64 for Methanol, 230.73 for water and 334.44 for Hexane extracts. Also the reductive potential *C. flammula* in FRAP method (mmol FeSO<sub>4</sub>/g Extract) was found to be in the ascending order of 18.67 in Ethyl-acetate, 8.98 in Methanol, 6.65 in Butanol, 4.24 in Hexane and 2.16 in water extracts. The results showed that the Butanol and Ethyl-acetate extracts of *C. flammula* had the highest antioxidant activity in both evaluated methods and so it is concluded that the major effective phytochemical agents of activity are extracted using these solvents. Therefore, further investigation is required for determination of phytochemical properties of species and its phytochemical strategy in resistance of industrial pollution.

**Keywords:** *Clematis flammula*, Phytochemical investigation, Iran

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## Study on some of Physiological Parameters of *Chenopodium rubrum* and *Chenopodium album* Subsp *album* in Sistan Region.

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Medicinal plants include substances that can be used for therapeutic purposes or prognosis for useful drug combinations, The medicinal value of these plants is in biological and photochemical compounds that have a certain physiological effect on the human body. The genus *chenopodium* of the *chenopodiaceae* family includes several endemic species in Asia, Europe and the United States and is used as food, medicines, or herbs. In recent years, proline has been shown to be a receptor of ROS produced in stress conditions. Carbohydrate changes are important because of their direct relationship with physiological processes such as photosynthesis, transmission and respiration. Osmotic regulators are one of the most important factors in preserving plants against abiotic stress. Soluble sugars are a group of compatible osmolites that accumulate in salt stress and act as osmotic agent or protector. Chlorophyll and chlorophyll fluorescence measurements have the potential to analyze the efficiency of photosynthesis of plants against environmental stresses, especially salinity stress, and its application facilitates the study of the stress state. In this study, Proline content, the rate of photosynthetic pigmentation and the soluble sugars content was measured in two types of *Chenopodium* (*Chenopodium rubrum* and *Chenopodium album* subsp *album*). Results indicated For *Chenopodium album*, the amount of chlorophyll a is 23.53, chlorophyll b is 23.74 and carotenoid is equal to 0.18, In the *Chenopodium rubrum*, the chlorophyll a content was 24.17 and chlorophyll b was 16.31 and the carotenoid was equal to 3.2 mg/g fresh leaves weight. also, the amount of proline in the *Chenopodium album* was 0.095 and in the *Chenopodium rubrum* it was 0.15 mg / g, The amount of soluble sugars in the *Chenopodium album* was equal to 47.45 in the leaves, in the root equal to 143.58 and in the stem was equal to 91.31 and in the *Chenopodium rubrum*, the sugar content in the leaves was equal to 44.04, at the root equal to 9.5 and in the stem was equal to 2 µg.ml.

**Keywords:** *Chenopodium*, Proline, Carbohydrate, Photosynthetic pigments

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## Formulation of a Topical Product for Joint Pain Relief Based on Iranian Traditional Medicine.

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Arthritis is a widespread, potentially disabling disease. The prevalence of rheumatoid arthritis is consistent worldwide affecting about 0.5-1.0% of the population. Radiographic evidence of osteoarthritis occurs in the majority of people by 65 years of age. The impact of arthritis on joint pain, disability, and quality of life results in a considerable burden to the individual, health services, and society. Despite the effectiveness of non-steroidal anti-inflammatory drugs (NSAIDs) on joint pain relief, serious gastrointestinal complications occur with their use which even lead to death. Herbal products could be extensively preferable due to their widespread accessibility and the vast experiential data retrieved from traditional medicine. *Costus speciosus* (Koen.) SM. oil is one of the medicaments prescribed for joint pain relief by Iranian Traditional Medicine (ITM) scholars. Moreover, anti-inflammatory and analgesic effects of the plant have been demonstrated in modern literatures. Considering the better durability of ointments than oils, this study was conducted with the aim of formulation and quality control of a topical ointment from *c. speciosus* oil retrieved from ITM. For this purpose, costus oil was first prepared based on ITM instruction. In the following, several formulations were tested for selecting an appropriate ointment base for herbal product. In addition to physical characteristics and accelerated stability studies, rheological behavior and microbial content of the final product were evaluated. Finally, a herbal ointment containing 75% of costus oil was prepared using white petrolatum, eucerine and white bees wax as ointment base components. In addition, the ointment successfully passed microbiological tests and exhibited plastic behavior which is in favor of a topical product. So, the prepared herbal ointment could be introduced as a natural formulation for further studies in the field of joint pain relief.

**Keywords:** *Costus speciosus*, Topical product, Joint pain

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## Effects of Fe and Zn Spray on Nitrogen Deficiency in *Thymus* and *Lavandula*.

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*Thymus vulgaris* and *Lavandula angustifolia* are multidisciplinary medicinal and aromatic plant of Lamiaceae family. They have great importance in fragrance and pharmaceutical industries. In present study the effects of Fe and Zn spray on these plants under nitrogen deficiency was studied as random complete design. Two months plants was irrigated by Hoagland solution for one month, then plants treated by Hoagland solution containing half, quarter and free nitrogen each for two weeks. Control and under deficiency plants sprayed by Fe and Zn 1% and 2% once every two weeks. The results showed that nitrogen deficiency treatment decreased growth factors (lengths, fresh and dry weights, relative water content and leaf area) in all plants, but spray of micronutrients (Fe and Zn) increase the plants growth. Also the roots and shoots length of plants, fresh weights and dry weights, relative water content and leaf area enhanced significantly ( $P < 0.05$ ) either in control or deficiency plants under spray treatments, the effects of Fe and Zn 2% was greater than 1%, especially Zn 2%. Menthol and linalool constituents was increased in essential oil of *thymus vulgaris* under deficiency treatment; that increase was higher in plants sprayed by Fe. Also in essential oil of *Lavandula angustifolia* linalool and menthone constitutes was increased significantly under deficiency plants. It seems that spray of micronutrients improve the tolerance of plants to nitrogen deficiency, especially thymus. Zn showed the better results compare to Fe. There was a positive significant correlation ( $P < 0.05$ ) between growth factors, also there was a positive significant correlation between nitrogen deficiency and essential oil.

**Keywords:** Deficiency, Essential oil, Iron, Medicinal plant, Zinc

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## Evaluation of Anti-Depressant and Sedative-Hypnotic Effects of *Mentha spicata* Essential Oil.

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Depression and sleep disorders are the major psychological problems in the human life. Although there are several effective medications to treat or control these psychiatric disorders, but most of these medications have limited efficacy and unwanted side effects. Researchers are always looking for new drugs, especially those of natural origin, and they hope that the investigation for newer medications, especially natural products, could be helpful to solve these problems. In this study we investigated the anti-depression and sedative-hypnotic effects of *Mentha spicata* essential oil, using experimental models including pentobarbital induced sleep test and forced swimming test. Forced swimming test was carried out on Swiss male mice, while another test performed on NMRI mice with a body weight of 20–25 g (n=10 in all groups). The *Mentha spicata* essential oil was prepared and then administered intra-peritoneally to mice at different doses (50-100-200 mg/kg). The effects of different doses of *Mentha spicata* essential oil were compared with the control group. Administration of 200 mg/kg *Mentha spicata* essential oil increased the sleeping time induced by pentobarbital compared to the control group and decreased the immobility time in mice in the forced swimming test. As the results of experimental tests, the reduction in the immobility time of mice in the forced swimming test, and the increase in the sleeping time in pentobarbital induced sleep test following administration of *Mentha spicata* essential oil in different doses, indicated the anti-depressant and sedative-hypnotic activity (1, 2)

**Keywords:** *Mentha spicata*; Depression; Hypnotic; Forced swimming; Sleep.

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## Dormancy Breaking in *Atropa belladonna* L. Seeds

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*Atropa belladonna*, commonly known as belladonna or deadly nightshade, is a perennial herbaceous plant in the Solanaceae family. Atropine "and" Scopolamine "are compounds of this plant that have important medicinal properties. *Atropa belladonna* seeds had dormancy. This experiment was conducted to determine the effect of different treatments of dormancy breaking on germination of belladonna seeds in the year 2017 in a randomized block design with three replications. Treatments were different concentration of gibberlic acid (500 and 1000 ppm), KNO<sub>3</sub> (0.1 and 0.2 %) and control condition. The results of the analysis of variance showed that treatments had significant effects on 1% levels. The results of comparison of mean of sleep defeat treatments indicated that gibberellic acid at two levels of 500 and 1000 ppm and potassium nitrate 0.1% had the highest germination percentage. The results indicated that *Atropa belladonna* L. Seed had Physiological dormancy prevents.

**Keywords:** Germination, Seed, Physiological dormancy, Gibberellic acid, KNO<sub>3</sub>

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## Evaluation of Some Morphological Characteristics of *Narcissus tazetta* L. under Drought Stress Conditions.

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*Narcissus tazetta* L. belongs to *Amaryllidaceae* family which is one of the most important ornamental and medicinal plants. *Narcissus* is a bulbous and perennial plant. Drought is one of the most important factors limiting plant growth in all over the world and the most common environmental stress. A pot experiment based on completely randomized design with three replications was conducted at Research Field of Faculty of Agriculture, University of Birjand, Birjand, Iran in 2017. Experimental treatments included four drought levels: 90, 70, 50 and 30% FC. With daily weighing of all the pots, their moisture was determined and the water deficit was compensated for each treatment to reach intended FC. The results of analysis of variance showed that the effect of drought stress on all vegetative traits was significant at 5% level compared to control. Drought treatments significantly reduced volume and weight of roots but not seen significantly difference between 30 and 50% FC. Also, considerably decline was found for the length of roots in 30% FC. Drought treatments significantly reduced diameter and weight of bulbs compared to control which was in agreement with findings of Sabet Teimouri et al. (2011) on saffron [3].

**Keywords:** Drought stress, Root, Bulb, *Narcissus*

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## Study Effect of Water Deficit Stress at Vegetative and Reproductive Stages and Plant Density on Physiological and Biochemical Characteristics of Purple Coneflower (*Echinacea purpurea* L.).

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In order to study the effect of water deficit stress at vegetative and reproductive stages as well as plant density on some physiological and biochemical characteristics in purple coneflower (*Echinacea purpurea* L.), an experiment was conducted at the Experimental Field of the Agricultural Faculty of Bu-Ali Sina University, Hamedan on 2013 and 2014 growing season. Treatments were studied in a split plot experiment based on randomized complete block design with three replications. The main plots included different irrigation levels (based on maximum allowable depletion of available soil water) and their combination that considered for both vegetative and reproductive stages, so that 35% maximum water depletion as the control and 60% and 85% as water deficit stress levels were applied during the plant growth. Also, 60% and 85% at vegetative stage, 60% and 85% at reproductive stage as well as vegetative and reproductive control were considered. The sub-plots consisted of three plant densities (8, 12 and 16 plants/m<sup>2</sup>). The results showed that, the leaf relative water content, photosystem quantum yield (F<sub>v</sub>/F<sub>m</sub>) and variable fluorescence (F<sub>v</sub>) were obtained from the control. Chlorophyll a concentration, total chlorophyll and carotenoid were reduce under water deficit stress, while the amount of proline, soluble carbohydrate, electrolyte leachage percentage and the activity of antioxidant enzymes including superoxide dismutase, peroxidase, catalase and glutathione reductase were increased. The greatest percentage of essential oil was belonged to 60% water depletion at the complete and 85% at complete and reproductive stages respectively. The interaction effect of year and irrigation on the chlorophyll a and soluble protein also the interaction effect of year and plant density on the total chlorophyll was significant.

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**The Effects of Different Types of Green Pruning and Flower Tinning on Anthocyanin and Antioxidant in *Diospyros kaki*.**

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Persimmons (*Diospyros kaki*), came from subtropical climates of China and Japan originally. Its history in China goes back to two thousand years ago; but, it is new in Iran. Studies have shown that fruits, vegetables, and their wastes have antioxidant properties. Researches have shown that Phenolic compounds (such as flavonoids, anthocyanin, and phenolic acids) create the antioxidant properties of plant products. These natural compounds often protect the body from harmful free radicals, and they are known to reduce the risk of various types of abnormalities such as cancers, cardiovascular diseases, strokes and diseases exacerbated by oxidative factors. If we do not take care of the tree, it will give plenty of fruit in one year; consequently, fruit can break the branches. The tree uses all its nutritional materials for its fruit with no more storage. This research was conducted in Gorgan, Golestan Province in order to determine the level of anthocyanin and Antioxidant fruit with four types of pruning treatments (control, pruning 1/2 branch, pruning 1/4 and flower thinning). The factorial experiment was conducted in a randomized complete block design with two factors. The first factor was pruning type in four levels and the second factor was the location of fruits in two levels. Chemical properties (antioxidant and anthocyanin) were measured. The results of the analysis of variance show that there is a significant difference among all treatments at a level of one percent in terms of the antioxidant level. The results indicate that pruning has a positive effect; however, no significant difference was observed in anthocyanin levels.

**Keywords:** *Diospyros Kaki*, Pruning, Antioxidant, Anthocyanin

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**Effects of Salinity Stress on Some Morphological Traits of *Narcissus tazetta* L.**

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*Narcissus tazetta* L. belongs to Amaryllidaceae family which is one of the most important ornamental and medicinal plants. *Narcissus* is a perennial and bulbous plant. Salinity stress is the most limiting factor for agricultural productions in drought areas. Thus, a pot experiment based on completely randomized design was conducted in August 2017. Experimental treatments were included four salinity levels: urban water (control), 20, 40 and 60 mM NaCl. The results showed that salinity stress had significant effect on all vegetative traits, compared to control. Salinity treatments promoted a significant reduce in diameter and weight of bulbs, compared to control. Salinity also declined length, volume and weight of roots considerably, but was not seen significant difference between salinity various concentrations, which was in agreement with findings of Salehi & Bahadoran (2015) on tuberose. As a result, salinity stress showed a undesirable effect on morphological traits of *Narcissus* plant, compared with control.

**Keywords:** Bulb, *Narcissus*, Root, Salinity stress

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## Hydrogen Peroxide Is Involved in Podophyllotoxin Production in Cell Culture of *Linum album*.

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Understanding of the metabolic pathways in cell culture of *Linum album*, facilitates mechanism of production of podophyllotoxin (PTOX) under oxidative stress in this plant. *Linum album* is one of the major sources of lignans, including PTOX and 6-methoxy podophyllotoxin, phenylpropanoid dimers with diverse bioactive pharmaceutical, can be obtained from cell cultures of *Linum album*. These compounds with antiviral and anti-cancer properties, are used as a precursor for the semi-synthesis of established cancer therapeutics such as etoposide, teniposide and etopophos[1]. Reactive oxygen species and hydrogen peroxide ( $H_2O_2$ ) are highly toxic to plant cells. However, they play important roles as signaling molecules in controlling and regulating many plant biological processes including pathogen defense, programmed cell death photosynthesis, gene expression, growth, development and exerts a number of diverse signal functions in in plant secondary metabolite synthesis [2]. The sources of  $H_2O_2$  in the oxidative burst have been extensively studied and plasma membrane NADPH oxidase has been demonstrated to be the main producer in plants and suspension culture cells challenged with pathogens or elicitors. In order to investigate the relationship and/or interactions of reactive oxygen and PTOX production in *Linum album*, suspension cells treated with Imidazole (IMD), an inhibitor of NADPH oxidase in the plasma membrane, which can inhibit the production of  $H_2O_2$  by inactivating NADPH oxidase. In single treatment experiments sterile IMD in concentrations (0, 50, 100, 250  $\mu$ M) were added to 7-day-old cell cultures and were harvested after 48 hours. PTOX quantified by high-performance liquid chromatography (HPLC). The results showed that 50  $\mu$ M IMD decreased content of  $H_2O_2$  and cell growth compared to control also PTOX production was achieved 2.9  $\mu$ g/g FW compared to control 7.2  $\mu$ g/g FW. IMD increased flavonoid and phenol contents in cell culture *linum album*. Taken together, these findings suggest that IMD decreased content of  $H_2O_2$  via inactivity NADPH oxidase and it appears  $H_2O_2$  up-regulates the phenyl alanine pathway and accumulation PTOX in cell culture of *Linum album*.

**Keywords:** Podophyllotoxin,  $H_2O_2$ , Imidazol, *Linum album*

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## Investigation of Different Treatments Effects on Dormancy Breaking of *Nigella sativa* L.

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Seed dormancy is a common phase of the plant life cycle; different treatment can be used for breaking dormancy. The aim of this study was found treatment for breaking dormancy of *Nigella sativa* L. (black cumin). This study based on completely randomized design with 3 replications in agriculture laboratory of payam noor university. for seed germination of black cumin used the different treatments. Black cumin seeds treated with GA3 (500 and 1000 ppm) and Nitrate potassium (0.1 and 0.2%). The germination percentage was tested on of black cumin seeds. The results showed that among the treatments of black cumin, the highest mean germination index (80%) was obtained by treatment of seeds with 1000 ppm GA3 and minimum germination was under using 0.1% nitrate potassium (52%).

**Keywords:** Medicinal plant, Germination percentage, Chilling, Soaking, GA3 treatments.

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## Introduction of Greater Celandine (*Chelidonium majus* L.) as a Mixoploid Medicinal Plant.

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*Chelidonium majus* L. from Papaveraceae family, herbaceous perennial plant, is considered as an important medicinal plant. It is native to Europe and western Asia and introduced widely in North America. Its distribution in the Middle East is limited to Iran and Turkey. Its location in Iran is north and northeast of the country (Gilan, Golestan and Mazandaran). The plant contains, as major secondary metabolites, is quinoline alkaloids, such as sanguinarine, chelidonine, chelerythrine, berberine and coptisine. One of these uses is the treatment of diseases such as infection, eczema, skin cancer and preventing the formation of kidney stones. In this plant, it is essential to know about the genetic diversity for a successful and lasting efficiency. Previous records of chromosome numbers for species belonging to the genus *Chelidonium* are supposed to be  $x=5$  and  $x=6$ . Obtained root tips from young seedlings of *Chelidonium majus* L. Were pretreated in hydroxyquinoline solution with 50 drops of DMSO and stained by using aceto-iron hematoxylin. Mixoploidy (*Diploid*  $2n=2x=12$ , and *Tetraploid*  $2n=4x=24$ ) in the root meristems of seedlings of some plants were observed. Diploid cells are dominant in the mixoploids.

**Keywords:** Chromosome, Medicinal plant, Mixoploidy, Ploidy levels

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## Study of Morphological Characters and Essential Oil of Different Populations of *Achillea wilhelmsii* C. Koch.

One of the most important methods of protection and survival of plants in nature is the cultivation and domestication of plant species and the selection of the best population. According to the necessity of cultivating and domesticating medicinal plants, in this research, 22 accession of *Achillea wilhelmsii* C. Koch were planted and evaluated in Alborz Research Station, the Institute of Forestry and Rangeland Research. This research was done in randomized complete block design in 2013-2015. In order to study and compare the morphological characters of different accessions this plant were measured characters at 50% flowering time such as plant height, canopy cover, number of main stems, number of capitulum per plant, number of florets in capitulum, fresh and dry weight of plants and essential oil content. The extraction was carried out by water distillation method with Clevenger. Analysis of variance and mean comparison showed that accessions had significant differences at 1% level. The results showed that Saqez 1 had the highest plant height, dry weight of plant, number of capitulum and florets and essential oil content. The correlation of studied characters with each other was significant at 1% level, but there was no significant correlation between essential oil content and other characters except for the number of capitulum. Using principal components analysis, 5 the first component, explained 99 percent of the total variation. The characteristics of canopy cover, plant height, number of stems, number of capitulum, fresh and dry weight of plants with positive factor had the most important role in the first component and Justified 75% of the variance. In the cluster analysis, the accessions were divided to 3 groups that accession Saghez1 was the indicator in a separate cluster.

**Keywords:** *Achillea wilhelmsii* C. Koch, Correlation, Analysis cluster, Accession

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## Effect of Various Light Spectra with Led Lighting Source on The Morphology of *Thymus Vulgaris* L.

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Thyme (*Thymus vulgaris* L.) is a member of the Lamiaceae family, which from the aromatic and medicinal points of view is indeed the most important species and is widely used as a flavoring agent, a culinary herb and a herbal medicine. Light as an important environmental factor, influences many aspects of plant growth and development in urban agriculture, plant growth is limited by the availability of light. Light emitting diodes (LED) could provide specific quality and quantity of light overcoming existing limitations for normal plant growth. In this study the plants were grown under hydroponics conditions and various light spectra with LED lighting source in four incubators with completely randomized designs and nine replications. In this study, the devices fabricated were lighted with 100 % red, 100 % blue, 70 % red plus 30% blue or 100% white LED with 150  $\mu\text{mol m}^{-2}\text{s}^{-1}$  light intensity. Stem height and length, leaf length and width, canopy diameter and internode length were measured. The results shown that the red-blue light led to maximum canopy diameter and minimum leaf and stem length. The red light led to maximum leaf length and width and stem length, but the blue light led to minimum stem height and canopy diameter and the white light led to minimum leaf width and maximum stem height. Our findings demonstrate that LED could improve economic characteristics of Thyme by probably stimulating plant metabolism.

**Keywords:** *Thymus vulgaris*, Light emitting diodes, Morphology

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## Investigation of Cytotoxicity Effect of *Caesalpinia bonduc* on Prostate Cancer Cell Line.

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Cancer is one of the main reasons of death all over the world. Prostate cancer is the most widespread cancer in the men. Medicinal plants are the important resources for discovering novel medicines, especially for cancer treatment [1]. One of these important applications is usage of them as cytotoxic factors for treatment of cancers and tumors. *Caesalpinia bonduc* (Leguminosae) is a medicinal plant widely distributed in tropical and subtropical regions of Southeast Asia. In traditional medicine different parts of the plant are used to treat asthma, chronic fever, cough, headache and stomach upset. Different parts of the plant have shown a variety of pharmacological activities such as antimicrobial, adaptogenic, contractile activity in smooth muscles and skeletal muscles and antifilarial activity. Phytochemical research indicated that cassane furanoditerpenoids are the most active constituents distributed in the genus *Caesalpinia*, which display significant antiproliferative, antimalarial, antibacterial, antihelmintic, and antineoplastic effects. In our research, legums, seeds and aerial parts of *Caesalpinia bonduc* were extracted at room temperature with methanol. Then these extracts were concentrated and dried. They were tested for their cytotoxicity and antiproliferative activity against DU-145 (prostate carcinoma cell line). Antiproliferative activity of these compounds was measured by using the MTT-micro culture tetrazolium assay. Briefly, cells were harvested and seeded into a flat bottom 96 well plate. After 24 h incubation, the test agent was added to give final concentration of 125, 62.5, 31.25, 15.62, 7.81, 3.9 and 1.95  $\mu\text{g/ml}$ . After 24, 48 and 72 h of incubation at 37 °C, 10  $\mu\text{l/well}$  MTT was added and the plate was again incubated at 37 °C for 4 h. DMSO (100  $\mu\text{l}$ ) was added to each well to dissolve the formazan dye by gentle shaking for 15 min. The plates were read immediately in a plate reader operating at 540 nm. Mean values were calculated and the IC<sub>50</sub> values for each cell line were interpolated from the dose response curve. The results were showed that these extracts had inhibitory activities against Du-145 prostate cancer cell line.

**Keywords:** *Caesalpinia bonduc*, Extract, Cytotoxicity, Prostate Cancer Cell line

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## Investigating the Role of Solvent and Methods of Extraction on Antioxidant Activity of *Zataria multiflora* Boiss. Using Two Methods of DPPH Radical Scavenging and Ferrous Reducing Antioxidant Potential (FRAP).

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Medicinal plants are a complex of different phytochemicals with a variety of biological activities. On the other hand, the key role of oxidants has been known in the pathogenesis of different disease. Oxidation is a chemical reaction that can produce free radicals, leading to chain reactions that may damage cells. Antioxidants terminate these chain reactions and have beneficial health effects. *Zataria multiflora* Boiss is an endemic plant to Iran (known as Avishane Shirazi) belongs to Lamiaceae family. Different pharmacological effects of this plant has been reported for example anti-inflammatory, anticonvulsant, anti-viral, Antioxidant activity of the plant extract and essential oil have been reported in the literature. In this work we aimed to study the effect of solvent and the method of extraction on the antioxidant activity of this plant. The plant was gathered from Kerman province at June 2017. Aerial parts of the plant were dried in shade. After milling, passed through the sieve (mesh 30). The plant was extracted in different methods of Soxhlet, sonication and maceration with water and methanol. The extracts were concentrated under vacuum and dried in oven. Serial dilution of the extracts were provided and antioxidant effect of the extracts was assayed using diphenylpicrylhydrazyl (DPPH) free radical scavenging effect and Ferrous reducing antioxidant potential (FRAP). These two methods are simple, inexpensive and accurate and can evaluate the antioxidant effects of natural antioxidants especially herbal ones. For the reference, green tea was used in both tests and butylated hydroxytoluene and Vit C were used in DPPH and FRAP method respectively. The results indicated that the methanolic extracts have significant antioxidant activity in both methods of DPPH and FRAP. Antioxidant effect of the plant was not significant difference in methods of sonication, maceration and Soxhlet. These results indicate that the antioxidant components of *Z. multiflora* are thermostable and are from nonpolar and or semipolar components of the plant. More studies have been carrying out.

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## Alleviation of Drought Stress and Changes in Antioxidant Potential of the Medicinal plant Moldavian Balm (*Dracocephalum moldavica* L.) by Symbiosis with *Micrococcus yunnanensis*.

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Moldavian balm (*Dracocephalum moldavica* L.) is a perennial herb belonging to the Lamiaceae family. This medicinal plant is very sensitive to drought and water deficit stress. Worldwide extensive research is being carried out to develop strategies to cope with drought stress through development of drought tolerant varieties, shifting the crop calendars, and resource management practices which most of these technologies are cost-intensive. Recent studies indicate that microorganisms can help plants to cope with drought stress. Beneficial soil bacteria have been known for long to be involved in plant growth promotion via mechanisms such as phytohormones production, suppression of plant diseases and improved nutrient acquisition by nitrogen fixation, phosphate solubilisation and metal accumulation. Since Moldavian balm is an important medicinal plant but is sensitive to water stress, the goal of this research is to provide the condition that Moldavian balm can growth under drought stress and produce sufficient secondary metabolites. To the best of our knowledge, there are no reports on the symbiosis of Moldavian balm and *Micrococcus yunnanensis*. In the present research the effects of symbiosis on the reduction of drought stress and changes in antioxidant potential were investigated. The study was conducted as a factorial experiment based on the randomized complete block design with six irrigation levels, including 100, 85, 70, 55, 40 and 25% Field Capacity (FC). The results showed that drought stress alone reduced the plant growth (fresh and dry weight) as compared to control plants. In addition, the antioxidant activity of ethanolic extracts measured by DPPH [3] and the amount of phenolic compounds were increased by drought stress. Plant growth was highly improved by the bacteria inoculation. The results suggest that Moldavian balm can't be successfully grown in areas with limited available water and that bacteria inoculation should be employed to improve the growth of this plant under drought stress conditions.

**Keywords:** Antioxidant activity, Drought stress, *Micrococcus yunnanensis*

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## Rapid and Green Synthesis of Silver Nanoparticles Using Aqueous Spathe of *Phoenix dactylifera* L. Extract and their Catalytic Activity for 4-Nitrophenol Reduction.

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We have developed a fast and eco-friendly green synthesis of silver nanoparticles (AgNPs) from silver nitrate solution using aqueous spathe of *Phoenix dactylifera* L. (Tarooneh) extract. Bioreduction process was carried out to study about the factors affecting the nanoparticles synthesis by changing the silver ion concentration, extract solution concentration, pH and temperature. Phytosynthesized silver nanoparticles of dimensions 7-8 nm were characterized using transmission electron microscopy (TEM), X-ray diffraction analysis (XRD), UV-visible spectroscopy (UV-Vis) and fourier-transform infrared (FTIR). The catalytic activity of silver nanoparticles was investigated in the reduction of phenolic contaminations to the lower toxic compounds. Efficient catalytic reduction of 4-Nitrophenol (4-NP) to 4-Aminophenol (4-AP) in the presence of NaBH<sub>4</sub> and colloidal silver nanoparticles was found [1].

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## An Investigation on the Main Secondary Metabolites in Essential Oil and Verifying Polyphenol Properties in Fennel Extract (*Foeniculum vulgare* Miller).

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*Foeniculum vulgare* Mill commonly called fennel is a medicinal plant belonging to the Umbelliferae (Apiaceae) family, known and used by humans since antiquity, due to its flavor. It is cultivated in almost every country, however, cultivated and being wildy grown in different part of Iran. In traditional medicine it has been used for its antioxidant, antitumor, chemo preventive, cytoprotective, hepatoprotective, hypoglycemic, and oestrogenic activities. As it is a common medicinal plant in house herbal drug shelf of lots of people, the present study was conducted to identify the main secondary metabolites presented in fennel (*Foeniculum vulgare* Mill.) vegetative shoots native to Jahrom region in Fars province, Iran. It was done using GC technics and by calculating kovats index for each found compound. 32 compounds were found which was a wider range according to presence of revealed compounds in previous studies and perhaps it may be affected of ecotype and geographical parameters of the region. Trans-anethol, fenchone, estragole and limonene were the most major components. In the second part of this research, Methanol and water extract of Fennel were examined to compare the presence of polyphenol compounds in them based on BHT. The results indicated that the fennel shoot extracts contained appreciable levels of total phenolic contents. Of course methanol extract of fennel showed more polyphenol characteristics by the amount of 894 BHT, mg/100 g. according to the results of this research *Foeniculum vulgare* grown in this area can be nominated as a good source of traditional medicine and it can provides a noteworthy basis in pharmaceutical biology. It is suggested that more complementary studies would be operated in future to develop or formulate new drugs and future clinical uses based on this plant.

**Keywords:** Fennel, Extract, Phenol\_test, Secondary metabolites

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## The Effects of Green Pruning and Flower Tinning on PH and Tannin in *Diospyros Kaki*

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Persimmons from Ebenaceae family, known as *Diospyros kaki*, originated from China and Japan. Its history in China dates back to two thousand years ago; however, its history in Iran dates back to one hundred years ago. These fruits grow appropriately in subtropical climates. The astringent and bitterness tastes in persimmons, especially when they are green and raw, are because of a substance called tannin. This substance in fruit is more effective than other substances in fruit tastes and flavors. The climatic conditions can affect the amount of these substances, and subsequently, they can change the tastes of fruit. Pruning plays an important role to regulate sprouting, maintaining the vigor and the plant health especially for fruit picking. Moreover, pruning can also be effective in producing fruit because the branches absorb a large amount of nutrition from the roots. Climatic conditions can arbitrarily regulate budding by deleting additional branches. Thus, it prevents the excessive pressures and loads which can cause weakening and gradual destruction of the tree. This research was conducted in a garden in Gorgan in Golestan province to check the fruit tannin and pH with four types of pruning treatments (control, pruning 1/2 branch, pruning 1/4 branch and flower thinning). The factorial experiment was conducted in a randomized complete block model with two factors (The first factor is the type of pruning in four levels, and the second factor is the place of fruit formation in two levels). Furthermore, chemical properties (including pH and tannin content) were measured. The results of the analysis of variance show that there was a significant difference between treatments at the level of 5% for pH and tannin. Finally, they indicated the positive effect of pruning on the treatments.

**Keywords:** *Diospyros Kaki*; Pruning; Tannin; Ph

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## Effects of Alternating Cold plasma Treatment on Seed Germination and Seedling Growth of Carrot *Texta* Cultivar.

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In the family of Apiaceae, carrots (*Daucus carota*) and some of the cultivars are vegetable and medicinal plants. The lack of uniformity in germination of carrot seeds is a problem. Cold plasma is one of the newest physico-chemical methods for influencing the germination of seeds that positive effects on seed of several species of plants have been observed. Plasma is the fourth type of material which is characterized by various methods, including electrical discharge. In this study, the feasibility of using alternating cold plasma and its effect on seed germination of carrot was evaluated. Alternating cold plasma treatments were applied to dry and wet seeds for 30 second. Control treatments were without plasma. 5 replicates per treatment and 24 *Texta* cultivar carrot seeds with same size for every replicate were considered and in petri dishes with a diameter of 9 cm were placed with a layer of filter paper. The seeds were kept at 25 °C with 16 hours of light and 8 hours of darkness. After a month, germination percentage, germination rate, fresh and dry weights, mean seedling length and seedling vigor index in terms of seedling length (I) and seedling vigor index in terms of dry weight (II) were calculated and compared with control. Differences in germination percentage, germination rate and seedling vigor index (II) of treatments with control were significant due to the effect of alternating cold plasma and dry treatments were better than control and wet treatments. This corresponds to the previous reports results in the traits of the rate and percentage of germination and in terms of seedling vigor index (II), it is similar to the results of plasma experiments on Okra seeds. Effects of alternating cold plasma on the mean seedling length and seedling vigor index (II) of seeds were not statistically significant but dry treatments were better than wet treatments for the two mentioned traits. Creating a rotational period in the application of cold plasma to germination of carrot seeds with the application of continuous cold plasma, has shown a better effect on dry carrot seeds. It seems that in the future this technology could be used in germination and subsequent growth of carrot seedlings and other medicinal varieties in Apiaceae family.

**Keywords:** Carrot, Alternating Cold Plasma, Seed Germination

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**Investigation of Seed Germination and Seedling Growth of Marigold (*Tagetes erecta* L.) under the Allelopathic Effects of Aqueous Extracts of Narcissus (*Narcissus tazetta* L.).**

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Marigold (*Tagetes erecta* L.) belongs to Asteraceae family is a herbaceous plant with aromatic, pinnately divided leaves and is usually used as bedding plant and cut flower [1]. In order to evaluate the allelopathic effects of leaf aqueous extracts of narcissus (*Narcissus tazetta* L.) on germination characteristics and growth of marigold (*Tagetes* spp), an experiment based on completely randomized design was conducted with three replications at Research Laboratory of Faculty of Agriculture, University of Birjand, Birjand, Iran in 2017. Experimental treatment included leaf aqueous extracts of narcissus (0, 0.5, 1, 1.5 and 2% w/v). The results showed that leaf extract of narcissus significantly reduced the percentage and rate of germination of marigold seeds. The lowest germination values were obtained in 2% concentrations of extract. Also, with increasing concentrations of aqueous extracts, seedling growth indices including root length, plumule length and seedling dry weight were significantly decreased compared to control that was in agreement with reports on *Lolium perenne* [2]. In general, the results showed that leaf aqueous extracts of narcissus had allelopathic effects on seed germination and seedling growth indices of marigold.

**Keywords:** Allelopathy, Growth indices, Inhibitory effect

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**Biotransformation of Androst-4-ene-3,17-dione by Genera of *Aspergillus* and *Fusarium*.**

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Androst-4-en-3,17-dione (AD) which is a fundamental intermediate for invaluable steroid drugs, belongs to the 17-keto steroid family and has been used in the industrial synthesis of estradiol or estrone [1]. In the present study, the potentials of the useful fungi genera including two *Aspergillus* and three *Fusarium* species have been evaluated in the biotransformation of androst-4-ene-3, 17-dione (AD) which is the precursor of the invaluable steroid drugs [1, 2]. Incubation of AD by *A. sp.*PTCC 5266 produced 11 $\alpha$ -hydroxy-AD as the only product with the high yield of 86% in the regio-, and stereoselective manner. Moreover, biotransformation of AD by *A. nidulans* resulted in the formation of two hydroxylated metabolites including as the major product (65%), together with 7 $\beta$ -hydroxy-AD (18%). On the other hand, biotransformation of AD by *F. solani* produced metabolite (54%) and testosterone (14%). *F. oxysporum* led to a mixture of 14 $\alpha$ -hydroxy-AD (38%) and testosterone (12%). Finally, testosterone as the only bio-product (42%) was obtained from bioconversion by *F. fujikuroi*. The all metabolites were chromatographically purified and subsequently identified through <sup>1</sup>H, <sup>13</sup>C NMR and other spectroscopic data.

**Keywords:** Androst-4-ene-3,17-dione, Biotransformation, *Fusarium*, 11 $\alpha$ -Hydroxylation

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## Evaluation of Antioxidant Activity of Some Ecotypes of *Smyrniium cordifolium* Boiss. Essential Oils of Root in the Southwest of Iran.

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*Smyrniium cordifolium* Boiss, from Apiaceae family, which has a species in Iran and has the widespread distribution in the west and southwest of Iran, with antibacterial properties as well as in traditional medicine as diuretics and antilithic effects. In this research, the antioxidant activity of root essential oil was investigated in ten vegetation regions of southwest Iran. Samples were collected from Chaharmahal and Bakhtiari, Kohgiluyeh and Boyer-Ahmad provinces at the full flowering stage. After drying them in shade, their essential oils were culled using a Clevenger apparatus, and then the antioxidant activity of the essential oil of smyrniium root with the use of 2 and 2 diphenyl-1- hydrazil-picyrilide (DPPH) method was based on the percentage of free radical inhibition. The highest antioxidant activity was obtained from Shah Qasem dam ecotype with IC<sub>50</sub> value 0/33 µg/ml and the lowest antioxidant activity was obtained from Mahmoud Abad ecotype with IC<sub>50</sub> value 8/59 µg/ml. The results showed that essential oil of *Smyrniium* had high antioxidant activity and the difference in antioxidant activity among ecotypes was influenced by plant climate [1].

**Keywords:** *Smyrniium*, Antioxidant activity, Apiaceae

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## Estimation of Antioxidant and Total Phenol Content of *Moriera spinose* Boiss.

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Plant kingdom is a very rich source of secondary metabolites producible using modern agricultural and industrial technologies and applicable in food, pharmaceutical, hygienic etc. sectors. *Moriera spinose* Boiss is one of these valuable plants and its antioxidant and total phenol content were reported in this study. Antioxidant activity was estimated using DPPH radical scavenging test and moderate antioxidant activities with IC<sub>50</sub> values ranging from 25.1 to 208.9 µg/ml were recorded for the plant. Total phenolic contents of the plant extracts as gallic acid equivalents were also evaluated in the range of 22.2 to 129.8 µg/mg.

**Keywords:** *Moriera spinose*, Extract, Antioxidant activity, Total phenol.

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## Estimation of Antioxidant and Total Phenolic Compounds Content of *Ferulaasa foetida*.

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Recent findings have explored the relationships between human chronic diseases and oxidative stresses leading to the encouragement of search for dietary antioxidants. Many phytochemicals, particularly phenolic compounds, have been found to possess strong antioxidant activities and are able to reduce the risk of these diseases. *Ferula asa foetida*, a valuable plant native to Iran, has a remarkable history of consumption in Iranian folklore. Thus, evaluation of its antioxidant and total phenolic compounds content were performed in this study. Antioxidant activity assay using DPPH radical scavenging test showed moderate antioxidant activities with IC<sub>50</sub> values ranging from 173.8 to 302.0 µg/ml for the plant. Total phenolic compounds content of the plant extracts as gallic acid equivalents were also estimated in the range of 25.4 to 38.8 µg/mg.

**Keywords:** *Ferula asa foetida*, Antioxidant activity, Total phenol, Extract



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**Evaluation of the Effect of *Viola odorata* Hydroalcoholic Extract on Tolerance to Analgesic and Dependence of Morphine in Male Mice.**

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Previous studies have been showed the sedative, anti-anxiety, hypnotic and preanesthetic effects of *Viola odorata* (VO) [1,2]. The aim of present study was to evaluate the effect of VO hydroalcoholic extract on tolerance of analgesic and dependence of morphine in male mice. In this experimental study, seventy-two male mice (20-30g) were randomly divided into 12 groups of 6: Negative control groups received normal saline (10 ml/kg), positive control groups received clonidine (3.5mg/kg) and treatment groups received VO (50, 100, 200 and 400 mg/kg). Dependence was induced in four day by administration of different doses of morphine (50, 50, 75 and 50 mg/kg) [3]. In last day 2 hours after single dose of morphine, naloxone was injected (5 mg/kg) and withdrawal signs were recorded during 30 min. In this study, tolerance to anti-nociceptive effects of morphine was evaluated by hot-plate test. Results showed that 200 and 400 mg/kg of VO were attenuating all signs of morphine withdrawal and tolerance on morphine analgesic activity in hot-plate test. However, further studies need for clarify their exact mechanism of antidepressant-like activity.

**Keywords:** *Viola odorata*, Extract, Morphine Withdrawal, Analgesic; Mice.

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**Surfactant Film Coating Aid in Germination under Drought Stress.**

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Drought stress can be a barrier to the successful establishment of vegetable Farms. Film coating technology may provide a novel approach for delivering soil surfactant in these environments. Our purpose was to describe a more efficient approach for applying soil surfactant using film coating technology. Within a laboratory growth chamber study, we compared the response of uncoated seed to seed coated with a soil surfactant. Five surfactant-coating rates were evaluated in the study, 0, 0.125, 0.25, 0.5, 1.0, 1.5 g of product/Kg of seed. Seeds were sown in a fine-sand with two soil moisture; 23% and 6% dry weight of soil. In general, surfactant coatings responded similarly. Slight improvements were also found in some surfactant coatings.

**Keywords:** Surfactant, Film coating, Germination, Drought stress

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**Effect of Inoculation of *Mycorrhizal arbuscular* Fungi on Survival and Morphological Traits of *Myrtus communis* L. under Drought Stress.**

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The medicinal plant of *Myrtus communis* L. that distributed in arid and semi-arid regions of the country, due to contain many medicinal active compounds such as essential oil, tannin, phenol and flavonoids, its have many drug uses. The purpose of this study was to investigate the mycorrhizal fungus inoculation on the improvement of growth characters under drought stress in controlled conditions of greenhouse. The experiment was carried out in a factorial of  $4 \times 3$  in a completely randomized design with 3 replicates (each replicate had 4 seedlings). The treatments applied in this experiment consist of water deficit stress in 3 levels of control (100% FC (field capacity)), moderate (60% FC) and severe (30% FC) and inoculation in 7 levels (control (no inoculation), inoculation with mycorrhizals of *Glomus mosseae*, *G. intraradices*, combination of *G. mosseae* + *G. intraradices*, inoculation with rhizobacterias of *Pseudomonas fluorescens*, *P. putida* combination of *P. fluorescens* + *P. putida*) that conducted in a 6 months period. The results of Two Way ANOVA showed that the interaction of drought stress and inoculation of mycorrhizal fungus at 1% and 5% level on growth and morphological traits such as survival, leaf area, root length, root volume, root biomass and total biomass of the seedlings were significant but did not significant effect on leaf and stem biomass. So that with increasing levels of drought stress all of the seedlings characters showed a decreasing trend, but inoculation with mycorrhizal fungi led to improve the performance of plant under drought stress, so that in all traits, treatment of drought stress 100% FC and combination of two types of mycorrhizal fungi was the highest and the treatment of 30% FC and non-inoculated showed the lowest. The results of the study also showed that the effects of drought stress and inoculation of mycorrhizal fungus alone had a significant effect on all morphological traits of seedlings. Overall, the results of this experiment indicated that the symbiosis with Arbuscular mycorrhizal fungi can led to increase the morphological traits under drought stress conditions and also improve resistance to drought stress of seedling. Effect of both species of *G. intraradices* and *G. mosseae* was almost identical.

**Keywords:** *Myrtus communis*, Mycorrhizal symbiosis, Drought stress, Leaf area, Total biomass



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## An Investigation on the Effect of Different Salinity Levels on Germination and Some Vegetative Traits of *Ocimum basilicum* L.

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Basil (*Ocimum basilicum* L.) is one of the important plants in Lamiaceae family which is used in many countries as both vegetable and medicinal plant. However it is a very sensitive plant and Salinity as one of the main environmental stresses that effectively reduce the performance of agricultural products, can also effect on different morphological and physiological characteristics and also its yield. Thus, an experiment was performed in IAU, Jahrom branch, to investigate the germination and some of growth characteristics of this medicinal plant under different salinity treatments. In this research five common populations related to Khorasan, Khozestan, Esfahan, Khoramabad and Mahalat were studied. The seeds were planted in Petri dishes in RCD with three replications and three treatments. The treatments included three levels (3%, 6% and 9%) NaCl and of course an instance. Salinity levels were made by using pure sodium chloride and distilled water. Evaluated traits were included germination percentage, germination rate, radicle length, wet and dry weights. The results showed germination percentage and other growth factors of all populations were decreasing under different levels of NaCl treatments, while more increasing in salinity concentration; more showing sensitivity of populations. Of course different populations showed significant differences which can indicates on the effect of ecotype and geographical characteristics for one species. Also the results showed that among studied populations, Esfahan was the most resistant one.

**Keywords:** NaCl, Basil, Germination Percentage, Germination Rate

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## Effect of Compost as Processed Organic Fertilizer on Growth and Antioxidant of *Lavandula angustifolia* Leaf in Vegetation Period under Drought Stress.

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Lavender is a plant belonging to Lamiaceae family and not native to Iran. Its leaves are intertwined with along, strong smell. This plant reduces the risk of cardiovascular disease or cell death and cancers. Given the common use of compost in agriculture, forestry, landscaping and environmental restoration, it is essential that it is perfectly compatible with plant growth and, if possible, that it increases production and quality of plant biomass. Compost is a stabilizing agent for aerobic conditions, and this process is produced from the effects of living micro-organisms. drought stress is characterized by reduction of water content, diminished leaf water potential and turgor loss, closure of stomata and decrease in cell enlargement and growth. In order to investigate the effect of compost and drought stress, the experiment was conducted in the form of nine levels consisting two levels of compost and two levels of dryness and a combination of them, each with three replications. Antioxidant was measured by the 2, 2-diphenyl-1-picrylhydrazyl method and growth by fresh weight measurement. The results showed that 10% compost had more effect on antioxidant growth than 30% compost. Also, 9-day drought stress had more positive effect on antioxidant properties than 5 days' drought. Compost and drought could be used for increasing antioxidant of *Lavandula* to be better medicinal plant [1,2].

**Keywords:** Compost, *Lavandula*, *Angustifolia*, Antioxidant, Drought Stress

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## Evaluation of the Antidepressant Effect of *Oenothera biennis* Oil in Animal Models of Depression in Male Mice.

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Previous studies have been showed the sedative and anti-inflammatory effects of *Oenothera biennis* (OB) [1]. The aim of present study was to evaluate the antidepressant effects of OB oil in animal models of depression in male mice. In this experimental study, eighty-four male mice (20-30g) were randomly divided into 14 groups of 6: Negative control groups received normal saline (10 ml/kg), positive control groups received fluoxetine (20mg/kg) and imipramine (30mg/kg) and treatment groups received OB oil (10, 20,40 and 80 mg/kg). In both of tests, immobility time recorded during 6-min. Also, two behavior of swimming and climbing were recorded [2]. The extract at a dose of 40 and 80 mg/kg significantly and dose dependently reduced immobility time compared to control group in FST and TST ( $p < 0.001$ ). Also, these doses significantly and increased swimming time ( $p < 0.05$ ) without any significant change of climbing time ( $p > 0.05$ ). Based on present findings *Oenothera biennis* have considerable antidepressant-like activity and their effect similar to fluoxetine and it seems serotonergic system involved their antidepressant-like activity. However, further studies need for clarify their exact mechanism of antidepressant-like activity.

**Keywords:** Antidepressant, *Oenothera biennis* oil, Animal models, Serotonergic System

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## Analysis of Rosemary Essential Oil by GC–mass Spectrometry and Total Phenolic Content of Plant Extract by Spectrophotometry.

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Essential oils from air-dried rosemary (*Rosmarinus officinalis*) were separated by cleverger apparatus and identified using the GC-MS with NIST library [1]. Whole plant extract obtained by Soxhlet method was used to predict antioxidant properties through total phenolic content by spectrophotometry assay at 765 nm using Folin-Ciocalteu spectrophotometric method. Results of GC- mass indicate that rosemary Essential oils contain of 202 components with concentrations higher than 0.01%, which accounts for 98.52% of the total relative content of plant essential oil. The most important structures with more than 1% of concentration of rosemary Essential oils were  $\beta$ -Cymene (1.08%), eucalyptol (4.84%), Linalool (1.62%), camphor (8.88%), Borneol (12.32%),  $\alpha$ -pinene (2.48%), Terpineol (1.51%), Verbenone (11.94%), Camphene (1.57%), Bornylene (3.05%), Bornyl acetate (4.57%), Caryophyllene (3.41%) and Isocamphane (1.1%). Total phenolic content of rosemary methanolic extract was  $17.16 \pm 2.18$  mg/100g of DM. Results suggest that *Rosmarinus officinalis* can be used as antioxidant in foods as food additives to avoid oxidation because of their high phenolic contents and on the other hand, its essential oil contains specific components with health effects.

**Keywords:** *Rosmarinus officinalis*, Gas chromatography–mass spectrometry, Phenol

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## Effects of some Micronutrients Spray on Phosphor Deficiency in *Sage* and *Pennyroyal*.

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*Salvia officinalis* and *Mentha pulegium* are important aromatic herbs from lamiaceae family which possesses valuable terpenoids constituents and have great importance in pharmaceutical industries [1]. In present study the effects of Fe, Zn and Cu spray on these plants under phosphor deficiency was studied as random complete design. Two months plants was irrigated by Hoagland solution for one month, then plants treated by Hoagland solution containing half, quarter and free nitrogen each for two weeks. Control and under deficiency plants sprayed by Fe, Zn and Cu 1% and 2% once every two weeks. The results showed that phosphor deficiency treatment decreased growth factors (lengths, fresh and dry weights, relative water content and leaf area) in all plants, but spray of micronutrients (Fe, Zn and Cu) increase the plants growth. Also the roots and shoots length of plants, fresh weights and dry weights, relative water content and leaf area enhanced significantly ( $P<0.05$ ) either in control or deficiency plants under spray treatments, the effects of micronutrients 1% was greater than 2%, Fe 1% about *Mentha* and Zn 1% about *Salvia*. It seems that spray of micronutrients improve the tolerance of plants to phosphor deficiency, especially *Mentha*. There was a positive significant correlation ( $P<0.05$ ) between growth factors. 1,8-cineole and camphor constituents was decreased in essential oil of *Salvia officinalis* under deficiency treatment; that increase was higher in plants sprayed by Fe. But pulegone and 1, 8- cineole constitutes was increased significantly in essential oil of *Mentha pulegium* under deficiency plants. There was a positive significant correlation between phosphor deficiency and essential oil in *Mentha*.

**Keywords:** Essential oil, Medicinal plant, Phosphor, Zinc

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## A Drug Controlled Randomized Study on the Antidepressant Effect of Albizia Julibrissin Extract.

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Albizia julibrissin (Persian silk tree, pink silk tree) is a species of tree in the family Fabaceae, The species is usually called "silk tree" or "mimosa". Albizia julibrissin flower extract are showing significant antidiabetic, antiinflammatory and anti-obesity properties. It is also well known remedy for anxiety, depression, sleep problems (insomnia), to improve mood; cancer, sore throat and to reduce swelling associated with trauma in traditional Chinese and Indian medicine as well as shows an important and very significant in vitro anti-tumor activity. This study aims to assess the effect of Albizia julibrissin aqueous extract on the Social Isolation Stress Induces Depressive-Like Behavior in mice. For induction of Depressive-Like Behavior, the mice were kept in individual housing for 8 weeks. the extract was administered at a dose of 30 mg/kg and 60 mg/kg BW for 7 days. Controls received vehicle (distilled water) through the same route as in the treated groups. Fluoxetine 10mg/kg was injected and the mice were used as substitute for standards for behavioural studies. the Tail Suspension Test was used to evaluate the anti-depressant effect. the result indicated that the Albizia julibrissin extract significantly decreased immobility time during the Tail Suspension Test which showed that it has antidepressant activity. the amount of antidepressant effect of herbal extract was equivalent to fluoxetine. The evidence of these Albizia julibrissin antidepressant effects can be identified from its pharmacological action though not much dimension has been explored, Albizia julibrissin can be beneficial for future research and can be of great medicinal use.

**Keywords:** Albizia julibrissin, Antidepressant, Fluoxetine, Tail Suspension Test

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**Effects of *Glomus caledonium* Fungus on Essential Oil Composition in *Thymus daenensis* at Full Flowering Stage.**

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*Thymus daenensis* belongs to Lamiaceae, is distributed in Iran and used as a traditional medicine. In this study, effect of *Glomus caledonium* fungus on essential oil composition of *Thymus daenensis* at full flowering stage was investigated. The main components of the essential oil of the control plants belonged to  $\alpha$ -pinene (71.00 %), thymol (65.62%), m- cymene (7.48%), eucalyptol (4.85%) and caryophyllene (4.59%). *Glomus caledonium* led to high content of thymol (71.77%) whereas decrease in m- cymene (4.50%), caryophyllene (2.00%), eucalyptol (3.48%) and  $\alpha$ -pinene (0.42%) [1,2].

**Keywords:** *Thymus daenensis*, Thymol, *Glomus caledonium*

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**Quantification of Steroidal Saponins in Different Plant Organs of *Ruscus hyrcanus* Growing wild in Iran.**

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*Ruscus L.* species belonging to the family Asparagaceae are slowly growing perennial semi-shrubs, naturally distributed in the Mediterranean, South central Europe and Caucasus. *Ruscus aculeatus* (Butcher's-broom) is introduced as a garden and house plant in some parts of the world as the evergreen stems with typical leaf-like flattened branches (cladodes). The plant rhizomes and roots contain steroidal saponins including ruscogenins and neoruscogenin that are used in medicine and cosmetics for their antiinflammatory, venotonic, antihemorrhoidal activity. *R. hyrcanus* Woron grows in the northern forests of Iran in Guilan and Mazandaran Provinces. In this study, the contents of ruscogenin and neoruscogenin in different plant parts of *R. hyrcanus* (phylloclade, stem, rhizome and root) were determined using RP-HPLC. Analysis was carried out using Waters' symmetry C-18 column with water: acetonitrile (30:70) as mobile phase with UV detection ( $\lambda=200$  nm). HPLC analysis indicated the highest content of ruscogenin (1.96 mg/g) and neoruscogenin (0.76 mg/g) in rhizome. Phylloclade, stem and root contain 1.15, 0.56, 0.37 mg/g ruscogenin and 0.11, 0.13, 0.69 mg/g of neoruscogenin, respectively. The obtained information can be applied in breeding programs and further exploitation of the plant.

**Keywords:** *Ruscus L.*, Saponin, Wild population, Plant part, HPLC

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**Study on Two Medicinal Compounds Production; Acteoside and Echinacoside in *Scrophularia striata* Boiss. Under Salicylic acid Treatment.**

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*Scrophularia striata* Boiss. is a native species of Scrophulariaceae family in Iran and it has high potential for production of phenylethanoid glycoside compounds. Acteoside and Echinacoside (two important phenylethanoid glycoside) have pharmacological significance for their anticancer and anti-metastatic activities in medicinal field. In this study, the effect of salicylic acid as an elicitor to increase of these medicinal compounds production was investigated. For this purpose, the 30-days-old seedlings of *S. striata* were grown in a hydroponic system. After 4 weeks, the plants were treated by different concentrations of salicylic acid (0, 0/05, 0/1, 1, and 5 mM). Acteoside and echinacoside production were analyzed in aerial parts and roots, 72 h after treatment, by HPLC method. The results showed that *S. striata* is a sensitive plant to high concentrations of salicylic acid. Concentration higher than 0.1 mM SA treatment had negative effect on growth of plant. Moreover, echinacoside in treated aerial parts and roots significantly was increased 5 and 2-folds, respectively in compared to controls. Furthermore, our data showed significantly negative correlation between the production of acteoside either shoot and roots. The highest amount of acteoside was observed in treated shoot about 877  $\mu\text{g/g}$  FW. While in the treated roots, the amount of this compound significantly declined compared to controls.

**Keywords:** *Scrophularia striata*, Salicylic acid, Hydroponic culture, Acteoside, Echinacoside



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## Investigating the Effect of Alfa-Bis-Bolol on the Growth of Leishmania Major Promastigotes in a Culture Using MTT Test.

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Cutaneous leishmaniasis is one of the types of leishmaniasis that is endemic in many countries of the world, including Iran. The use of five-dose antimony compounds is the first line of treatment for all types of leishmaniasis. However, its high cost and great side effects has necessitated the production of drugs with lower side effects. Herbal remedies can replace existing chemical compounds. Therefore, in this study, the effect of alfibisaboleol extract on leishmaniasis promastigotes was investigated. Research method: First, the *Leishmania Major* (MRHO/IR/ 75/ER) parasite was cultured in NNN medium and then transported to the RPMI medium for mass production and then it was passed through till the number of cells reaches to  $1 \times 10^6$  cells in each milliliters. Then the alphabisabolol material was prepared in dilutions of 6.25, 12.5, 25, 50, 100 milligrams in milliliter and added to the parasite culture environments. The Promastigotes were taken from the culture medium and their parasitic activity was investigated under microscope in three 24, 48, and 72 hours turns. Finally, the number of promastigotes was obtained using the MTS method. The mean number of promastigotes in the culture medium was significantly increased under the influence of alfibisabolol extract with the increase of concentration and time ( $p < 0/05$ ). The alpha-bisabavol extract has an excitatory effect on the growth of promastigotes of the *Leishmania major*. Therefore, alphabisabolol has been used as a nutritious substance by the leishmaniasis parasites.

**Keywords:** Leishmania Major, Herbal extract, Alfibisaboleol, MTS

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## New Extraction Technique for Producing Antidiabetic Complementary Medicine from the Fenugreek (*Trigonella foenum-graecum* L) Seed.

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Fenugreek (*Trigonella foenum-graecum*) is one of the most widely used medicinal plants in folk medicine. It is known to have a diuretic, cardiogenic, hypotensive, hypoglycemic and hypolipidemic effects. The presence of valuable and variable secondary metabolites such as glycosides, alkaloids, essential oils, flavonoids, mucilages, tannins, and the like, made this plant as a very special medicinal plant [1]. In this study we tried to find a new extraction technique from the seed of fenugreek with maximum ingredients of secondary metabolites for producing antidiabetic complementary medicine. In this case we considered all the secondary metabolites that used to be known as antidiabetic. After examination of the different techniques, an individual extraction made to have all of the constituents in possible minimum volume of the extract. The most important of the secondary metabolites in this purpose was trigonelline that have maximum amount in the produced extract. As the purpose, we considered different mesh sizes in 3 different quantity of solvents to making an extract with maximum trigonelline. The active ingredients were measured by HPLC, quantitatively. After all we choose the best ratio of solvent into the seed with the most operational size of seed to make an extract with the best quantity of secondary metabolites in minimum volume as we need to producing medicine.

**Keywords:** Fenugreek, Antidiabetic, Extraction Technique, Trigonelline

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**Evaluation of the Antidepressant Effect of Hydroalcoholic Extract of *Ziziphus Vulgaris* in Forced Swimming Test and Tail Suspension Test in Male Mice.**

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Previous studies have been reported the sedative, analgesic, and antiseizure properties of *Ziziphus Vulgaris* (ZV). The aim of present study was to evaluate the antidepressant effects of ZV hydroalcoholic extract in forced swim test (FST), and tail suspension test (TST) in male mice. In this experimental study, eighty-four male mice (20-30g) were randomly divided into 14 groups of 6: Negative control groups received normal saline (10 ml/kg), positive control groups received fluoxetine (20mg/kg) and imipramine (30mg/kg) and treatment groups received ZV hydroalcoholic extract (50, 100, 200 and 400 mg/kg). In both of tests, immobility time recorded during 6-min. Also, two behavior of swimming and climbing were recorded. The extract at a dose of 200 and 400 mg/kg significantly and dose dependently reduced immobility time compared to control group in FST and TST ( $p < 0.001$ ). Also, these doses significantly and increased swimming time and climbing time ( $p < 0.05$ ). In addition, There was no significant ( $P > 0.05$ ) alterations in the count of crossing and rearing by ZV extract. Based on present findings ZV have considerable antidepressant-like activity and in seems serotonergic system involved their antidepressant-like activity. Therefore, *Ziziphus Vulgaris* may have potential therapeutic value for the management of depressive disorders.

**Keywords:** *Ziziphus Vulgaris*, Hydroalcoholic extract, Monoaminergic system, Animal models

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**Study of Essential Oil Content and Composition of Chamomile (*Matricaria recutita*) Accessions of Khuzestan.**

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*Matricaria recutita* (Asteraceae) is annual medicinal and hygienic plants which have anti-inflammatory and antispasmodic characteristics and are traditionally used as analgesic. *Khuzestan has chamomile habitats*. It is obvious that the application will also vary depending on the type and percentage of essential oil components. In order to investigate content and composition of Chamomile essential oil accessions, this experiment was conducted the form of randomized completed block design with three replications in Seed and Plant Certification and Registration Institute (SPCRI)-Karaj, Iran in 2017. Khuzestan populations of chamomile seeds (Ramhormoz, Andimeshk and Shadegan) were obtained from Gene Bank Department of Forestry and Rangeland Research Institute, Tehran, Iran. sowing the seeds, flowers of each accession were collected in full flowering stage. The plant materials were subjected to hydro-distillation after drying in the shade. The oil yields were calculated and the oil compositions were identified by GC and GC/MS analysis and retention indices. about essential oil content indicated accessions Andimeshk (0.99%) and Shadegan (0.99%) were in the same group. According to GC-MS and GC analyses a total of 25 constituents were identified in the essential oils. The main components in Andimeshk accession was  $\alpha$ -Bisabolone oxide A (63.5%). In Ramhormoz accessions  $\alpha$ -Bisabolol oxide A was 37.9% and was the highest compound. In Shadegan oil main components was  $\alpha$ -Bisabolol oxide B (22.4%). Chamazulene amount were 7.7% in Andimeshk, 6% in Ramhormoz and 7.9% in Shadegan accessions. According to the results, there are three chemotype of Chamomile in Khuzestan province:

1. Bisabolone oxide
2. Bisabolol oxide A
3. Bisabolol oxide B

This difference has a good impact on the biodiversity including the pharmacological properties and this phytochemical genetic diversity is the most important issue in the corrective program and the beneficial select of the plant-rich metabolic target in the use of the medicinal.

**Keywords:** Medicinal plant, Chemotype, Ramhormoz, Bisabolol oxide



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## Comparison of the Quality and the Cost of Herbal Extract Production by Supercritical Fluid Extraction and Using the Solvents in Industrial Scale

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Various methods are used to extract active pharmaceutical ingredients from medicinal plants depending on the cost-effectiveness and ease of use. Supercritical Fluid Extraction (SFE) process is one of the new and powerful methods for such separations, and it helps to use the high-performance supercritical fluid as a solvent. High temperature condition in some extraction methods makes them undesirable for some temperature sensitive herbs. In SFE method, temperature can be kept in a desirable level that does not damage the structure of the materials. Using this technique, a fluid with temperature and pressure upper than critical point is used to dissolve the active ingredients. CO<sub>2</sub> is one of the suitable fluids can be used for this purpose (T<sub>c</sub> = 31.06 °C, P<sub>c</sub> = 73.81 bar). In order to produce a product in industrial scale in addition to quality, the cost-effective production of a product is very important. A product can have an appropriate profitability when it comes to the lowest cost and the most appropriate quality. Therefore, in this research, the results of extracting the medicinal plants by supercritical fluid extraction and using solvent methods have been compared together and the final quality of the products has been discussed. Then, the estimation of production costs for the industrial production of herbal extracts including investment, energy consumption and labor costs was carried out and a comparison was made between the two extraction methods.

**Keywords:** Supercritical fluid extraction, Medicinal plants, Industrial scale

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## The Effect of Genotype of *Hypericum perforatum* L. on Secondary Metabolites.

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St. john's wort is a medicinal plant that distributed in tropical and subtropical regions of Africa, south America, Europe and north of Iran. These medicinal properties are attributed to the presence of various classes of biochemical compounds such as naphthodianthrone (hypericin), flavonoids, phloroglucinols (hyperforin), tannins, proanthocyanidins and bioflavonoids. The plant contains bioactive hypericin that accumulate in dark glands present especially in reproductive parts of the plant. Research has shown that plant species are effective on the amount of secondary metabolites. On the other hand, plants with different genotypes have variability response to in vitro culture condition. The aim of this study was to evaluate the production of hypericin in different genotypes of St. john's wort in order to select the best genotype for the production of hypericin in *in vitro* conditions. In this study, Iranian and foreign populations were used to evaluate hypericin production. The identification of hypericin was analyzed using an HPLC (Sykam, Germany) system with an C<sub>18</sub> column (particle size 5.0 μm, 200 mm × 4.6 mm). Also, the number of dark glands was counted as the most important morphological trait for evaluating the potential of plants in terms of hypericin production. The results showed that hypericin production had a positive correlation with the number of dark gland in each leaf; therefore, the plants with the highest number of dark gland had the highest levels of hypericin. In this research, Iranian population has the highest number of dark gland and so has the highest levels of hypericin. These results were consistent with the results obtained from HPLC. The number of dark gland in each leaf can be used as a rapid screening indicator for selection of experimental conditions in order to optimize hypericin function in *Hypericum perforatum* L. plants. According to the results, it can be said that Iranian populations can be used in breeding programs to produce cultivars for commercial purposes.

**Keywords:** Genotype, Hypericini, St. john's wort.

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## Abiotic Variables Affecting the Distribution of a Medicinal Species, *Artemisia aucheri* Boiss.

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*Artemisia aucheri* Boiss. is a medicinal and aromatic plant distributed in rangelands of Fars Province, Iran. In the current study, the relationship between environmental variables and spatial distribution of *A. aucheri* was studied in the northern mountainous parts of Fars Province. For this aim, the most important variables including, climatic, topography, and edaphic factors were selected. Then, the geographical distribution of *A. aucheri* was recorded in the study area. Subsequently, logistic regression model was used to identify the relationship between species occurrence and different environmental variables. The results indicated that mean annual rainfall, mean annual temperature, elevation, lithological units, acidity, and soil texture had significant impact on occurrence of *A. aucheri* in the mentioned area. The distribution of *A. aucheri* is limited to mountainous area with cooler temperature, elevation between 2300-3300 above sea level, sandy-loam soil texture, limestone geological formations, and  $\text{pH} \leq 7.8$ . Traditionally, *A. aucheri* is used as a feeding source by livestock of nomads and local villagers, as well as traditional herbal medicine. The application of this species as anti-poisoning, anti-septic, and anti-parasitic has been proved in the literature. The planning for conservation and optimal utilization could guarantee the *A. aucheri* populations in rangeland of Fars Province.

**Keywords:** *Artemisia aucheri*, Environmental factors, Species distribution, Herbal medicine.

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## The Absorption of Micro and Macro Elements, under Manure Fertilizers in *Satureja spicigera*

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In order to investigate the effect of different levels of manure fertilizers on *Satureja spicigera*, this research was conducted in Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran, in 2016. The experiment was conducted in the form of randomized complete block design with three replications. Treatments included different levels of manure as 0, 30 and 60 ton per hectare. Plots were 2 in 3 meters. The distance between the plots was 1 meter and the distance between the blocks was 1 meter too. Planting was carried out through transplantation. The harvest was done at flowering stage. Branches that dried in shade, used to measure the elements. Nitrogen, bromine, potassium, sodium, calcium and magnesium measurements were performed using Wahing et al., (1989) method. Phosphorus measurements using Chapman & Pratt, (1961), method and iron, manganese, zinc and copper in the dry matter of the plant were measured and determined by the method of atomic absorption of flames through the Elmer (1982). Data analysis was performed using SAS and comparisons of the meanings using Duncan's test. The results of variance analysis showed that the effect of manure on phosphorus, potassium and iron was significant. Therefore, in the case of direct use of the flower shoot of this plant in the food and pharmaceutical industry, due to the presence of more elements, especially iron with 60 tons of manure per hectare, the use of manure is recommended.

**Keywords:** *Satureja spicigera*, Nitrogen, Phosphorus, Potassium

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## Phytochemical Evaluation of *Hymenocrater longiflorus* Essential Oil and Extracts.

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The genus *Hymenocrater*, belong to the Lamiaceae family, consist of 21 species throughout the world. In Iran, about 9 species are present, of which some are endemic. Plants belonging to these genres are pharmacologically active and have been used in folk medicine all around the world. In the previous studies, *Hymenocrater* species showed different biological activities such as antioxidant, antiinflammatory, antimicrobial, cytotoxic and etc. In this project we studied on essential oil composition and phytochemical screening of extract the *Hymenocrater longiflorus*. The aerial parts of *H. longiflorus* growing wild in Kurdistan, Iran was subjected to hydrodistillation using a Clevenger to produce light yellow oils. The volatile constituents in the essential oil of *H. longiflorus* were investigated by GC/Mass. The dried aerial parts of *H. longiflorus* was macerated successively in *n*-hexane, ethyl acetate and methanol for 3 days at room temperature and the extract was concentrated in Rotary to give a green extract. The preliminary phytochemical analysis of the extracts carried out using standard procedures to identify the various constituents. The qualitative and quantitative phytochemical analysis of essential oil was performed and the major components of it were  $\alpha$ -Cadinol,  $\alpha$ -Terpineol and Caryophyllene oxide. The different extract of *H. longiflorus* afforded three major groups components as flavonoids, terpenoids and steroids. According to the dimensions of the compounds of *Hymenocrater* genus and their biological effects, the study on *H. longiflorus* has important effect on improvement of medicinal plant and pharmacological research.

**Keywords:** *Hymenocrater longiflorus*, Essential oil, Extract,  $\alpha$ -cadinol, Flavonoid

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## Comparative Study of Antioxidant Properties and Total Phenolic Content of Thirteen Wild Iranian Medicinal plants Using DPPH and FRAP Methods.

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Medicinal plants contain a wide variety of antioxidants, which may provide protection against the development of several diseases. Antioxidant properties and total phenolic content of methanolic extracts from different parts of thirteen species belonging to six botanical families grown in botanical garden of Mashhad were investigated. Studied species includes *Ballota nigra* (leaves), *Dipsacus laciniatus* (leaves and flower), *Eryngium caucasicum* (roset leaves and flowering shoots), *Grindelia robusta* (leaves and flowers), *Marrubium Vulgare* (leaves), *Origanum vulgare* subsp. *virid* (flowering shoots), *Phlomis fruticosa* (leaves), *Sanguisorba minor* (leaves) and *Stachys byzantina* (leaves). The antioxidant capacity was evaluated by two methods: DPPH (1,1-diphenyl-2-picrylhydrazyl radical) and ferric reducing/antioxidant power (FRAP). The total phenolic content was measured using a Folin-Ciocalteu assay. Extract yield for each plant was also determined. Results indicated that flowering shoots of *Origanum vulgare* subsp. *virid* have the highest amount of total phenolic content and the highest antioxidant activity in FRAP method. In addition, the lowest amount of total phenolic content and the lowest antioxidant activity (FRAP) was related to *Eryngium caucasicum*. Among species, *Phlomis fruticosa* showed the lowest IC<sub>50</sub> which means had the highest antioxidant activity (DPPH method). A positive strong correlation ( $p \leq 0.01$ ) was observed between total phenolic content and FRAP results, which suggests that polyphenols in the extracts are mostly responsible for the antioxidant activities. Based on results, leaves of *Grindelia robusta* showed the highest extract yield (0.19 g). In conclusion, so called medicinal plants, could be considered as a valuable resource for natural antioxidants and good alternative for synthetic antioxidants.

**Keywords:** Antioxidant activity, FRAP, Phytochemical properties, Wild plant

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## The Evaluation of Genetic Diversity in Fennel (*Foeniculum vulgare* Mill) Using ISSR Marker.

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Medicinal plants were considered as valuable genetic germplasm in Iran. One of these medicinal plants is fennel. Fennel (*Foeniculum vulgare* Mill) belongs to Apiaceae family. It is a perennial medicinal and spice plant. Fennel is cultivated in different regions of Iran. The aims of the present study were to assess the genetic variation among fennel landraces using ISSR molecular markers in 2016. In this research, 5 ISSR primers were used in which 33 were polymorphic. The polymorphism percent was 61/94 and the PIC was 0/47. The highest and the lowest PIC scores were obtained 0.42 and 0.5 for primer combined of RA3 and AA, respectively. Cluster analysis of thyme population by molecular markers data produced four groups on the similarity level 0.68. Maximum similarity coefficient ( $r=0.82$ ) was estimated between Esfahan-II populations and Karaj. This study revealed that ISSR marker could properly separate these landraces based on geographical distribution and similarity in climates and showed the wide genetic diversity among fennels studied.

**Key words:** Fennel, Genetic diversity, ISSR.

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## Investigation of Caraway Essential Oil Potential on Weed Control.

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Improving the yield of crops depends widely on effective management of competing weeds. The use of natural herbal products through allelopathy is a sustainable strategy. *Portulaca oleraceae* L. (portulacaceae) and *Avena ludoviciana* (Poaceae) are common weeds of farms, especially Soybeans, Canola, Corn, Barley and Wheat farms. plants, through the production of secondary metabolites, affect germination and the growth of surrounding plants. *Bunium persicum* (Apiaceae) is a medicinal plant with active compounds. In its essential oil exists 1-8-cineol and cuminaldehyde which can be a growth inhibitor. In order to investigate effect of Caraway (*Bunium persicum*) essential oil on germination and growth of Purslane (*Portulaca oleraceae*) and Wild oats (*Avena ludoviciana*) weeds, two experiments were conducted in the form of randomized completed block design with three replications in Professional Technical Training Center, Iran in 2018. seeds were obtained from Pakan Bazr co., Esfahan, Iran. treatments were essential oil by distillation from dried seeds of Caraway that applied by three concentrations included: zero (distilled water), 400ppm and 900ppm on the seed of two species. results showed that 400ppm and 900ppm reduced germination seed (43% and 40%) and average germination time (MTG) in weed Purslane, in comparison with control. 900 ppm, in addition to reducing germination, had the greatest effect on germination rate. Maximum germination rate coefficient (CVG) was 0.4 (control). The applied treatments in Wild oats, inhibited germination rate, radicle and hypocotyl length, and vigor seed, compared to control. Seed germination and average germination time (MTG) were lowest in 400ppm applied (50% and 4.9 s/d).

**Keywords:** Purslane, Wild oats, Sustainable agriculture, Allelopathy, Medicinal plant

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## The Effect of Inoculating Endophytic Bacteria on Stevia (*Stevia rebaudiana*) Growth.

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Stevia (*Stevia rebaudiana*) is a leafy plant which produces some natural sweeteners (steviol glycosides) in its leaves. In the present study, four gibberellin producing endophyte bacteria were inoculated in the Stevia leaves in order to find their effect on the stevia growth. The endophyte bacteria were included: *Acinetobacter calcoaceticus*, *Bacillus licheniformis*, *Bacillus pumilus* and *Rhizobium meliloti*. The results showed that endophyte bacteria were capable to alter the Stevia growth. Endophyte bacteria did not alter the stevia height and leaf area but significantly changed the stem dry weight, leaf dry weight and also leaf/stem ratio in Stevia. Results showed that *Rhizobium meliloti* significantly increased the stem and leaf dry weight of Stevia while other endophyte bacteria did not show a positive effect on these traits, in comparison with control treatment. The Stevia leaf dry weight was increased by *Rhizobium meliloti* inoculation in 45% value in comparison with control. All of these endophyte bacteria significantly increased the leaf/stem ratio in Stevia which could be a remarkable result, especially in a leafy plant such as Stevia. According to our results, it can be concluded that endophyte bacteria were capable to promote the leaf quantity in the stevia and *Rhizobium meliloti* was the more effective endophyte bacteria for Stevia.

**Keywords:** Stevia, Endophyte, Bacteria, *Rhizobium meliloti*



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## Wound Healing Effects of Olive Leaves Ointment Compared to Daru Darman Co. Derma Heal Ointment in Streptozotocin-Induced Diabetic Rats.

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Diabetic ulcers, one of the most common prevalent complications in diabetic patients, are becoming a serious concern worldwide. According to the International Diabetes Federation, There are 425 million people with diabetes in the World. There will be 629 million people with diabetes in the World in 2045. Wound healing in diabetes is primarily, associated with hyperglycemia, over-expression of inflammatory cytokines, oxidative stress, delayed collagen synthesis, reduced angiogenesis and also the microbial infections. Plant extracts with wound-healing properties have the potential for antioxidant, chelation, and antimicrobial activities and may act by one or more of these mechanisms. 36 male Wistar Rat weighing 180-220 g were divided into 3 groups of control, olive leaf ointment and derma heal ointment. In this experimental study, olive leaf extract Ointment 10% (Eucerin based) was provided by Razi Herbal Medicine Institute, Lorestan, Iran. Diabetes was induced by a single intraperitoneal injection of streptozotocin (65mg/ kg) in 0.1 M citrate buffer, pH 5.0. after 3 days, fasting blood glucose was measured using enzymatic oxidation method by a glucometer. Rats with blood glucose levels higher than 250 mg/dl were considered diabetic. Under ether anesthesia, the hairs on the back of all groups were shaved and a 1 cm long full-thickness incision was made. Animals in treatment groups treated with ointments and control group only received Eucerin Once a day for a total period of 14 days. The rate of wound contraction was expressed as percent contraction of the area of open wound. Two rats from each group was sacrificed and skin samples were prepared for histopathologic examination on days 3, 7, 14. On the 21th post-wounding day all animals were sacrificed. The isolated tissues were fixed in 10% formalin. It was dehydrated through graded alcohol series, cleared in xylene and embedded in paraffin wax (melting point, 56°C). Serial sections of 5 µm were cut, and stained with haematoxylin and eosin (H&E) stain. The sections were examined under light microscope and photographed. Contraction of wound in olive leaf ointment group was significantly higher when compared with control group in 3,7, 14, 21 days after wound creation (P=0). Contraction of wound in derma heal ointment group was significantly higher than control group (P=0). Derma heal ointment significantly was more effective when compared with olive leaf ointment. we demonstrated that wound closure was significantly shortened when the wounds of diabetic rats were treated with olive leaf ointment compared to control group.

**Keywords:** Diabetes, Wound, Olive, Streptozotocin, Rat

**References:** [1] International Diabetes Federation. <http://www.diabetesatlas.org/resources/2017-atlas.html>.

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## Alpha-Glucosidase Inhibitory Effect and Antioxidant Activity of Aerial Parts Extracts of *Otostegia* Genus.

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*Otostegia* genus (Lamiaceae/Labiatae) consists of about 33 species in Iran, only three species are available, *Otostegia aucheri*, *O. michauxii*, and *O. persica*, of which the last two are endemic to Iran. Inhibition of  $\alpha$ -glucosidase can ameliorate postprandial hyperglycemia that occurs in patients with type 2 DM. Adding antioxidants to the therapy of DM is intended to reduce complications caused by oxidative stress. There is a traditional usage in some regions of Iran, especially in Sistaan and Baluchestan, Kerman and Fars provinces where there is a strong belief in the anti-diabetic effects of this plants. Considering the inhibition of  $\alpha$ -glucosidase, this study evaluates the effects of *Otostegia* species extracts, dichloromethane (DCM), ethanol (EtOH) and ethyl acetate (EtOAc). Thus, the inhibitory activity of  $\alpha$ -glucosidase has been done using an *in vitro* model and antioxidant activity was measured by using ferric reducing antioxidant power (FRAP) and the scavenging activity of DPPH radicals methods. The results indicated that the antioxidant activity, scavenging of DPPH radicals and FRAP assay, of EtOAc extracts were potentially more active than two other extracts. Of all examined *Otostegia* species, *O. michauxii* was the most potent against DPPH radical scavenger (IC<sub>50</sub>= 24.09 ± 0.59 µg/ml) in comprising with the Quercetin as the positive control (IC<sub>50</sub>= 3.80 ± 0.21 µg/ml) rather than *O. aucheri* and *O. persica* with IC<sub>50</sub> values of 73.03 ± 0.9 and 140.28 ± 0.97 µg/ml, respectively. At FRAP assay, the outcomes of *O. michauxii* and *O. aucheri* were somewhat in the same range (in order: 368.95 ± 30.4 and 367.38 ± 4.7 mg FeSO<sub>4</sub>/g extract) with the expectation of *O. persica* which was 286.12 ± 2.3 mg FeSO<sub>4</sub>/g extract. Additionally, the inhibitory activity of the EtOAc extracts against  $\alpha$ -glucosidase were also the more active than DMC and EtOH extracts. The abilities of EtOAc extracts on inhibition of  $\alpha$ -glucosidase were as follows: acarbose > *O. michauxii* > *O. aucheri* > *O. persica* with the IC<sub>50</sub> values of 0.199 ± 0.01, 0.62 ± 0.03, 0.78 ± 0.02, 0.79 ± 0.03 µg/ml. Hence, the higher antioxidant activity, the better inhibition of  $\alpha$ -glucosidase. To the best of our knowledge, based on this screening, the EtOAc extract of *O. michauxii* could be considered as potential extract for further investigations to isolate the natural  $\alpha$ -glucosidase inhibitors.

**Keywords:**  $\alpha$ -glucosidase, *Otostegia* genus, Antioxidant, Lamiaceae/Labiatae

**References:** [1] Mozaffarian, V. *A Dictionary of Iranian Plant Names.*, Farhang Moaser, Tehran, Iran, 2003; pp. 592.

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**Effects of Aromatherapy with Lavender on Sleep Quality of Hemodialysis Patients.**

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Sleep disorders are common in hemodialysis patients, it can decrease the quality of life and increase the rate of death. Due to its sedative effects, lavender may be effective in promoting sleep quality of these patients. This research was conducted to examine the effects of aromatherapy with lavender essential oil on sleep quality of hemodialysis patients. This is a randomized clinical trial. 76 hemodialysis patients were selected by convenience sampling and were randomly divided into two groups: intervention and control. In the intervention groups, the patients were requested to inhale a piece of cloth smeared with three drops of the lavender essential oil during dialysis sessions. In the control groups, only the usual care was given. Results showed no significant difference in the mean sleep quality score between the experimental ( $9.29 \pm 2.60$ ) and control groups ( $7.86 \pm 2.12$ ) at baseline ( $p < 0.012$ ), but a significant difference was seen in mean sleep quality score between the experimental ( $3.89 \pm 1.98$ ) and control groups ( $8 \pm 2.32$ ) after the end of study ( $p < 0.001$ ). Aromatherapy with lavender essential oil positive effect on improving sleep quality in hemodialysis patients and may be used as a noninvasive, easy and low-cost method for sleep disorders in these patients.

**Keywords:** Aromatherapy, Hemodialysis, Lavender, Sleep quality, End stage Renal Disease

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**The Investigation of Anthocyanin, Carbohydrate and Antioxidant Activity of *Lactuca Serriola* Plant of South Khorasan Province**

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In the normal body's functions, free radicals are by-products of specific oxidation reactions, often for the elimination of pathogens or infected cells. Excess of these highly reactive species can initiate chain reactions that damage cells and, if not controlled, cause many diseases. Thus, although their generation is important, for example in control of pathogens, so is their localized controlled destruction to protect unwanted damage to healthy host cells. Substances which can stop these chain reactions by removing free radicals are called "antioxidants". Anthocyanins contribute greatly to the antioxidant properties of certain herbs. *Lactuca serriola* is an annual or biennial herb in the asteraceae family. Plants produce carbohydrates through the process of photosynthesis. They are used either as energy sources for vegetative growth and development or as precursors in the biosynthesis of a wide range of molecules including lipids, proteins, and polysaccharides. In this study, the plant was collected from Birjand in early May and the anthocyanin and carbohydrates were determined quantitatively, using dried plant. Also, the antioxidant activity of the plant was determined using DPPH as a radical scavenger.

**Keywords:** Antioxidant activity, Anthocyanin, Carbohydrates, *Lactuca serriola*

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**The Effect of Capsule Containing *Echium amoenum* L. and *Hypericum perforatum* Dry Extracts on Depressive Symptoms and Comparison with Fluoxetine.**

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Based on a traditional belief, *Echium amoenum* and *Hypericum perforatum* dried flowers are used in Iran as an anxiolytic remedy. In this study, efficacy of an aqueous extract of *E. amoenum* and *H. perforatum* in patients with mild to moderate major depressive disorder (a score more than 18 on the Hamilton depression rating scale) was evaluated. 30 patients were randomly assigned to receive twice a day either 20 mg fluoxetine or 350 mg of *E. amoenum* and *H. perforatum* extract compound in a 8-week double blind, parallel-group trial. Patients were assessed in weeks 0, 4 and 8 by the Hamilton Rating Scale for Depression (HAM-D17) and a score sheet on adverse effects. No significant differences between fluoxetine and *E. amoenum* and *H. perforatum* extract compound treated groups was observed after 4 and 8 weeks according to Hamilton score ( $p > 0.05$ ). In weeks 2 and 4 dry mouth was the only reported side effect which had significant differences between groups. ( $p < 0.05$ ) *E. amoenum* and *H. perforatum* extract compound have anti-depressant activity same as fluoxetine. But some of its side effects are lower than fluoxetine, and this herbal medicine can be used as a treatment for depression.

**Keywords:** Clinical trial, *Echium amoenum*, *Hypericum perforatum*, Major depression

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**The Effect of Potassium Nitrate and Gibberellic Acid on Seed Germination of Fennel (*Foeniculum vulgare* Mill) Under Light and Darkness Conditions.**

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*Foeniculum vulgare* Mill is a very famous and important medicinal plant in apiaceae family. This herbaceous plant contains useful phytochemical such as anethole, limonene, estragole, alpha-pinene, fenchone. The plant is used in pharmaceuticals and cosmetic industries. The plant has been used in traditional medicine systems from old time. It is used to improve disorders related to digestive, endocrine, reproductive, and respiratory systems. In general, seed germination of members of apiaceae family is low due to presence of some inhibitors in seed parts. The purpose of the study was to investigate effect of gibberellic acid (GA3) and potassium nitrate (KNO<sub>3</sub>) on germination of fennel seed in dark and light. Therefore, GA3 in four concentrations (0, 200, 400 and 600 mg/L) and KNO<sub>3</sub> in three concentrations as 0, 0.1 % and 0.3 % was applied on seeds and treated seeds were kept in dark or light in ambient room temperature. The experimental design was completely randomized design in three replications. The statistical analysis were done using SPSS software. At the end of the experiments germination was assessed using parameters including mean germination time, germination percentage, coefficient of velocity, time spread of germination, root length, shoot length and fresh and dry weight. The results revealed that highest and lowest germination percentage were belong to 0.3 % KNO<sub>3</sub> and GA3 600 mg/L respectively both in dark condition. The fresh weight of shoot (147.73 mg) and root (47.17 mg) was most in 0.3 % KNO<sub>3</sub> in dark and least in GA3 600 mg/L in light. The germination velocity was 29.53 for 0.1 % KNO<sub>3</sub> under light which was the maximum rate. In general it can be concluded that KNO<sub>3</sub> in concentration of 0.3 % was the most effective germination treatment.

**Keywords:** Gibberellic acid, Mean germination time, Germination percentage

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**Triterpenoidal Specialized Metabolites from Aerial Parts of *Salvia russellii* Benth.**

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The people of Turkey use *Salvia russellii* Benth (Lamiaceae/Labiatae) in the Turkish folk medicine to cure common colds, abdominal pains and also it is served as decoction tea, especially in central Anatolia [1]. The plant wildly grows in Turkey, Northern-west and West of Iran, Iraq and Syria [2]. The literature surveys shows that much attentions have been paid on isolation of terpenoids from *Salvia* L. species (Sage plants). Hence, our phytochemical investigation of a dichloromethane (DCM) extract of *S. russellii* aerial parts led to isolation and purification of a common phytosterol,  $\beta$ -sitosterol (1) along with the known triterpenoids, oleanolic (2) and ursolic acid (3). Silica gel open column chromatography followed by recrystallization of the DCM extract of *S. russellii* resulted in purification of Compounds, 1-3, and the structures of the isolated compounds are elucidated by using various spectroscopic methods including EI-MS and 1D <sup>1</sup>H-<sup>13</sup>C NMR and with comparison of the spectral data with those reported previously in the literature. To the best of our knowledge, this is the first report of the phytochemicals of the aerial parts of *S. russellii*. Furthermore, based on the high total phenol content (TPC value of 172.03  $\pm$  4.5 mg Ga/g extract) and consequently the remarkable anti-radical (IC<sub>50</sub> (DPPH• radicals)= 14.6  $\pm$  2.3  $\mu$ g/ml) scavenging activity of MeOH-H<sub>2</sub>O extract, it is suggested that the further investigations could be terminated to isolate the valuable specialized metabolites possessing the notable biological activities.

**Keywords:** DPPH• radicals, Lamiaceae, *Salvia russellii*, Oleanolic acid, Ursolic acid

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## Seed Germination and Dormancy Overcome in Response to Storage Condition and Different Treatments in Ten Medicinal Plants.

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To investigate the effects of storage condition and different treatments on Seed germination and dormancy overcome of ten medicinal plants, a two- step laboratory experiment were conducted at the Research Institute of Food Science and Technology of Mashhad. Plants included: catnip (*Nepeta cataria*), chicory (*Cichorium intybus*), Common wormwood (*Artemisia absinthium*), cumin (*Cuminum cyminum*), European columbine (*Aquilegia vulgaris*), fennel (*Foeniculum vulgare*), feverfew (*Tanacetum parthenium*), German chamomile (*Matricaria chamomilla*), henbane (*Hyoscyamus niger*), ispaghul (*Plantago ovata*). For each plant, four replications with 100 seeds in each, were considered. The germinator temperature was 20°C with a 12:12 photoperiod. Seeds of the both steps of the experiment, were stored for seven months in two conditions (refrigerator and room). In the first step, seed germination percentage of the half of the seeds was determined right after the storage and in the second step, germination percentage of the other half was evaluated after applying some treatments on dormant species, which showed germination problems. The treatments included applying gibberellic acid on six species, cold stratification on three species and mechanically scarification on one species. Results of the first step of the experiment indicated that plant species could be divided into three groups based on their germination percentage including three species with less than 20%, five species with 20 to 50% and two species with more than 50%. Based on the results of the second step, germination percentage of henbane seeds (*Hyoscyamus niger*) treated with gibberellic acid increased by 50% and this treatment was more effective in seeds kept in the refrigerator. Stratification caused 12% increase in germination percentage of chicory seeds (*Cichorium intybus*), which were stored in room. Scarification also showed 10% increase in catnip seeds (*Nepeta cataria*) in both refrigerator and room, but in those, residing in the refrigerator, germination was significantly higher. Overall, storing seeds in cold temperature and seed pretreatments could be promising but some methods have better results on particular species.

**Keywords:** Dormancy, Gibberellic acid, Medicinal plants, Scarification, Stratification

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## The Reaction Of *Satureja Mutica* To Different Macro Fertilizers.

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To investigate the reaction of *Satureja mutica* to different macro fertilizers, this experiment was conducted in Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran, in 2016. The experiment was conducted in the form of randomized complete block design with three replications. Treatments were including control, manure 30 ton/ha, manure 60 ton/ha, vermicompost 5 ton/ha, N50P25K25, N50P25K25M30, N50P25K25M60 and N50P25K25V5. Plots were 2 in 3 meters. The distance between the plots was 1 meter and the distance between the blocks was 1 meter too. Planting intervals were 40 cm long and between 50 cm lines. Planting was carried out through transplantation. The harvest was done at flowering stage. Branches that dried in shade, used to measure the flower shoot yield. the essential oil extraction was water distillation for 2 hours. The results of variance analysis showed significantly difference between fertilizers on flower shoot yield at  $P \leq 0.01$  and essential oil yield at  $P \leq 0.05$ . The results of mean comparisons indicated that the highest flower shoot yield (4338 kg/ha) belongs to manure 60 + N50, P25, K25. The highest essential oil percent (2/17%) achieved from manure 30 + N50, P25, K25 and the least (1/82%) was in manure 60 + N50, P25, K25. The highest essential oil yield (82/5 kg/ha) achieved from manure 30 and the least was (45 kg/ha) in control. The results of this study showed that the use of manure at 30 tons per hectare was the most effective treatment to increase the production of *Satureja mutica* in the first year.

**Keywords:** *Satureja mutica*, Essential oil, Manure, Nitrogen



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## Antioxidant Activity Determination of Ten Pomegranate (*Punica Granatum* L.) Varieties.

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Pomegranate (*Punica granatum* L.) belongs to Punicaceae family that is one of the richest resources bioactive compounds and use the frequency in nutrition, industry and herbal remedies. For studying antioxidant activity among different parts of ten varieties of pomegranate, a factorial experiment with two factors and three replications based on randomized complete design (RCD) was done. The first factor consist of ten varieties (Rababe khafir, Torsh-sabze khafir, Shirine khafir, Khajeh-Rabi Yazd, Sefid Tafti, Ghermez Yazd, Kheiri Arsenjan, Rababe Arsenjan, Zard-anar Arsenjan and Siahe-Neiriz) and second factor including different parts of fruit: epicarp, mesocarp, epicarp+mesocarp and seed. Antioxidant activity according with DPPH method and tannin content conforming Vanillin-HCL reagent was measured. The results showed significant differences among varieties in relation to factors measured. The highest antioxidant activity (91.97 and 90.90%) was determine in epicarp+mesocarp and mesocarp of Ghermeze-Yazd variety respectively. While the minimum antioxidant activity (less than 12%) was observed in seeds of Shirine khafir, Khajeh-Rabi Yazd and Sefid Tafti varieties. Regardless of varieties, the highest and lowest antioxidant activity (84.63 and 18.93%) was determined in epicarp+mesocarp and seed treatment respectively. In different accessions, the maximum antioxidant activity (68.58, 65.95 and 65.08%) was observed on Kheiri Arsenjan, Ghermez Yazd and Siahe-Neiriz respectively. On the other hand the minimum content (49.74, 52.65%) related to Khajeh-Rabi Yazd and Rababe khafir accessions. Totally, the results showed high variation among different varieties and fruit organs.

**Keyword:** *Punica granatum* L., Epicarp, Mesocarp, Accessions, DPPH

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## Effect of Electrical Conductivity of Nutrient Solution and Bicarbonate on Vegetative Growth of Watercress (*Nasturtium officinale*).

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*Nasturtium officinale* L is a perennial plant that belongs to the family Brassicaceae (1). Due to the presence of numerous and effective chemical compounds such as flavonoid quercetin, beta-carotene carotenoids, lutein and zeaxanthin and vitamin C, the antioxidant properties of *Nasturtium officinale* L has been emphasized (2). For proper growth and fruit production, i.e., improved function, each plant needs strong vegetative growth and sufficient food supply. This proper growth is possible if the root absorb optimal amount of water and nutrients (3). For the purpose of the study, a factorial and completely randomized design experiment was conducted using 9 treatments with three replications in Shahed University. The treatments consist of EC nutrition solution at three levels (2.1, 1.4, 0.7 ds / m) and bicarbonate at three levels (0, 3, 6 mEq / L). The results of ANOVA showed that the presence of these treatments affected all the properties in such a way that EC 2.1 ds/m and 3 mEq / L bicarbonate treatment had the highest effect on the plant height. Moreover, fresh and dry weight of the plants was significantly affected by the treatments ( $P \leq 0.01$ ). The highest fresh and dry weight of the plant was observed in EC 2.1 ds / m and 0 mEq / L bicarbonate treatment. Furthermore, the highest root fresh and dry weight was observed in EC 2.1 ds / m and 0 mEq / L bicarbonate. The effect of nutrient solution EC and bicarbonate on root volume were significant ( $P \leq 0.01$ ) and the highest effect was observed in EC 2.1 ds / m and 6 mEq / L bicarbonate.

**Keywords:** Medicinal Plant, Herbal Nutrition, EC Nutrition Solution, Bicarbonate.

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### Neuroprotective Effects of *Cinnamomum zeylanicum* Blume Oil in 1-methyl-4-Phenyl-pyridine-Induced Toxicity in PC-12 Cells.

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Parkinson's disease (PD) is the second most common chronic neurodegenerative disease which affects about 6 million people all over the world. Cinnamon (*Cinnamomum zeylanicum* Blume) oil is suggested as a therapeutic agent for neurodegenerative diseases in Persian medicine. Current study aimed to assess neuroprotective of cinnamon oil in 1-methyl-4-phenyl-pyridine (MPP<sup>+</sup>)-induced toxicity in PC-12 cells. Cinnamon bark was purchased from the market and was identified by a botanist. A voucher specimen of the sample was deposited in the herbarium. Cinnamon oil was prepared using cinnamon bark in sesame oil under sun radiation during a 40-day period according to Persian medicine text books. Rat pheochromocytoma-derived PC12 cells was cultured in Dulbecco's modified Eagle's medium with 10% (v/v) heat-inactivated fetal bovine serum, 100 U/ml penicillin and 100 mg/ml streptomycin. Cells was treated with various concentrations of MPP<sup>+</sup> and cinnamon oil. Normal saline was used as negative control. Cell viability was assessed using the methyl thiazoltetrazolium bromide method (MTT assay). Caspase-3, -8, and -9 activity was measured as apoptotic markers. Statistical analysis was performed with SPSS software and p value < 0.05 was considered as statistically significant. showed significant protective effect of cinnamon oil on the MPP<sup>+</sup>-induced cytotoxicity. Number of apoptotic cells in cinnamon oil treated cells were significantly lower in comparison to negative control (p < 0.05). Also, cinnamon oil could decrease the activity of all caspase -3, -8 and -9 and the effect was statistically significant regarding caspase-9 activity. results confirmed the neuroprotective effects of cinnamon oil in PC12 cells which supports the traditional use of this preparation for PD. Also, some cinnamon compounds such as cinnamaldehyde has previously represented antioxidant, anti-inflammatory and neuroprotective effects. Thus, future studies should be performed to identify the active ingredient of cinnamon oil as a neuroprotective agent.

**Keywords:** Parkinson's Disease, Neurodegeneration, Phytopharmacology, Persian Medicine

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### Phytochemical Investigation of *Thymus lancifolius* in Natural Habits of Fars Province of Iran.

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The genus *Thymus* has a wide distributional range and chemical composition of the essential oils varies with geographical location of collection site, climate and other ecological factors. In order to study the phytochemical properties of essential oil of Thyme species (*Th. lancifolius*) in different vegetative conditions, an experiment was conducted in three natural habitats of Fars province, site 1 (Bavanat), Site 2 (Neyriz) and Site 3 (Abadeh) between 2013 to 2015. The collected samples were extracted with Clevenger and the essential oils were analyzed by GC and GC/MS in three replicates and their chemical compositions were identified. The effects of topographic and climatic characteristics, as well as soil properties of all habitats on the amount of essential oil and its components in three sites, were studied and determined. The effort showed the amount of the rainfall and the essential oil percent had a significant high negative correlation ( $r = -0.837^*$ ). It means the essential oil percent is lower in higher amount of rainfalls. In Thyme essential oil, three sites of one, two, and three were identified as 21, 20 and 22, respectively that the major compounds in three sites were Thymol (57.1-67.3%), Carvacrol (19.6-28.1%), Borneol (2.2-5.1%), P-Cymene (1.8-4.1%),  $\gamma$ -Terpinene (0.4-3.5%), Cineole (0.8-2.7%), E-Caryophyllene (1.9-2.3%) and Linalool (1.2-1.9%). The analyses of variance of the data showed the essence composition of *Th. lancifolius* had a significant difference at five percent ( $\alpha = 5\%$ ) and one percent ( $\alpha = 1\%$ ) at different studied sites. Comparison of the mean essential components of this species in the studied sites showed that only the amounts of thymol, linalool, borneol, and carvacrol had a significant difference at level of 1%. The comparison of the mean of essential oil composition in the sites showed that the highest amount of thymol, paracymon, 1 and 8 cineol, boraneol and borneol were in Bavanat, and the highest amount of carvacrol was in Abadeh and caryophyllene belonged to the Neyriz. Data indicate that *Th. Lancifolius* is important in all three sites, especially in terms of thymol and carvacrol compounds. In addition, this species is important in the Koopan region because of the 1, 8-cineol, boronol and thymol compounds, and in the Meshkan plain, because of the composition of terpinene and E-caryophyllia. The high diversity of thymus essential oil compounds observed in this study. Therefore, this diversity has increased a selection possibility of this plant's colonies, with specific biological activity, for cosmetic, food and pharmaceutical industries [1].

**Keywords:** *Thymus lancifolius*, Phytochemical Properties, Ecological Factors

**References:** [1] Bigdeloo, M.; Hadian, J.; Nazeri, V. *Journal of Applied Research on Medicinal and Aromatic Plants.* **2017**, *7*, 95-98.



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## Effect of *Glomus caledonium* Mycorrhiza on the Amount of *Satureja sahendica* Bornm. Essential Oil

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*Satureja Sahendica* Bornm. belongs to the Lamiaceae family. The most important component in the essential oil is carvacrol, which has an antiseptic effect. In this research, the effect of inoculation of *Glomus caledonium* mycorrhiza on the amount of essential oil of *Satureja sahendica* cultivated in a research greenhouse in Urmia city was evaluated. Essential oil of aerial parts of *Satureja sahendica* was obtained by water-distillation method (Clevenger apparatus). The results showed that the essential oil content of the control and the plants treated with mycorrhizal fungus was 0.55 and 0.5 %, respectively. Therefore, the effect of *Glomus caldonium* mycorrhizal fungus on the essential oil content of *Satureja sahendica* was not significant (1).

**Keywords:** *Satureja sahendica*, Essential Oil, Urmia

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## Cytotoxic and Antioxidant Activity of *Cuscuta chinensis*

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*Cuscuta chinensis* Lam. (*Cuscutaceae*) is commonly used as a liver and kidney tonic. Different biological effects such as anticancer and antioxidant activities have been reported by Previous studies(1). The aim of present study was to investigate cytotoxic and antiradical activity of *C.chinensis*. *C.chinensis* was collected from samples cultivated in Hamadan city. The plant samples were authenticated in Department of pharmacognosy, School of Pharmacy, Hamadan university of Medical sciences. DPPH radical scavenging activity test was done for extract and vitamin c by the method of Nickavar et al. with some modifications(2). HCT-116 cell lines were treated with different doses (100, 200, 300, 400 and 500µg/ml) of aqueous extract after culturing in DM-EM medium. MTT test was carried out after 24 and 48 hours to evaluate cell viability. In addition, cytotoxic effect of extract was evaluated by LDH cytotoxicity kit. A concentration \_dependent radical scavenging activity was exhibited by the tested materials. IC50 value was 34.94 and 77.14µg/ml for vitamin c and extract, respectively. our results showed that the viability of HCT116 cells was significantly reduced after treating with different concentration of extract. IC50 was 200 (µg/ml) for 24 h, and was 150 (µg/ml) for 48 h. Our finding from LDH cytotoxicity assay also confirmed the cytotoxic effect of extract in concentration of 200, 300 and 400 (µg/ml). These results clearly indicate that *Cuscuta Chinensis extract* possess free radical savaging and cytotoxic activity and can be used against various oxidative stress related pathological conditions. Further studies is recommended for investigating the mechanism of cytotoxicity.

**Keywords:** *Cuscuta chinensis*, DPPH, MTT, Cytotoxicity

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## The Efficacy of Herbal Anti-hemorrhoid Suppository Containing Essential Oil of *Myrtus communis* in Reducing the Severity of Hemorrhoids and Its Complications.

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*Myrtus communis* have been used in traditional medicine for the treatment of inflammatory disease. The aim of this study was to evaluate the efficacy of a herbal anti-hemorrhoid suppository containing essential oil of *Myrtus communis* in the alleviation of hemorrhoids symptoms, and compare its effects with those of anti-hemorrhoid suppository in a randomized double-blind clinical trial. A total of 120 patients with hemorrhoids symptoms were recruited and randomized to receive either *M. communis* suppository or anti-hemorrhoid suppository for a period of two weeks. The severity and frequency of hemorrhoids symptoms were evaluated at baseline and at the end of trial. All evaluated symptoms (bleeding, permanent pain, pain during defecation, anal itching and irritation, heaviness and tenesmus) were significantly decreased by the end of trial in either of the study groups ( $p < 0.001$ ). The mean decrease in the severity of symptoms in the 10% essential oil group was 3.67%, in the group 15% essential oil was 2.53% and in the antihemorrhoid group 2.67%. There was no significant difference in the improvement rate for any of the assessed symptoms between *M. communis* suppository and anti-hemorrhoid suppository ( $p > 0.05$ ). The results of this research provide the evidence on the efficacy of *Myrtus communis* essential oil in the alleviation of hemorrhoids symptoms and further support the application of this plant as an anti-hemorrhoid agent in traditional medicine.

**Keywords:** Clinical Trial; *Myrtus communis*; Hemorrhoids

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## Cytotoxic Evaluation of Three *Ferula* Species Against MCF-7, K562 and HT-29 Tumor Cell Lines.

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Many investigations have proved different biological activity of *Ferula* genus (Apiaceae). The *Ferula* plant is a rich source of oleo gum-resin (OGR) and is much utilized in folk medicine. It has been established that some *Ferula* species have cytotoxic activity. This study was designed to analyze cytotoxic activities of *Ferula* plants and their OGRs, because these fields have extensively benefited of drug discovery from natural sources. In the present study, three *Ferula* species and their oleo-gum resins were collected from different regions of Fars province. Cytotoxic activities of methanol extracts of these plants' aerial parts and their oleo-gum resins were assessed for in vitro cytotoxicity against three tumor cell lines MCF-7 (human breast cell line), K562 (human blood cell line) and HT-29 (human colorectal cell line) and evaluated with the MTT assay and expressed as IC<sub>50</sub> values. Results indicated that methanol extracts of *F. gummosa* OGR have the highest cytotoxic effects against three cancer cell lines (IC<sub>50</sub> range: 11.6 to 15.4 mg/ml, followed by the methanolic extracts of *F. assa-foetida* OGR (IC<sub>50</sub> range: 9.5–19.6 mg/ml), methanolic extracts of *F. persica* OGR (IC<sub>50</sub> range: 17.5–24.1 mg/ml) and methanolic extracts of *F. assa-foetida* aerial parts (IC<sub>50</sub> range: 20.7–24.7 mg/ml) respectively. Results implied that various *Ferula* species (especially *F. assa-foetida* and *F. gummosa*) are valuable sources of natural compounds with important biological properties and these plants are suitable for further investigations in cancer researches.

**Keywords:** *Ferula*, Oleo gum-resin, Cytotoxic Effects, MTT assay, Tumor Cell Lines

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## Quality Properties of Peach Fruit (*Prunus Persica*, Cv *Alberta*) Affected By Microencapsulated Essential Oils.

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In this study, effect of *Rosmarinus officinalis* and *Thymus vulgaris* microencapsulated essential oils on storage life of peach fruits was investigated. Microencapsulated essential oils were prepared by simple coacervation. The treatments were: control, (no microencapsulation), two g of microencapsulated *R. officinalis* oil, two g microencapsulated *T. vulgaris* oil, one g *R. officinalis* oil microencapsul + one g *T. vulgaris* oil microencapsul and each 9 days physicochemical attributes of samples were investigated for 36 days of storage period. The results showed a significant delay in weight loss, titratable acidity, total soluble solids, decaying percentage and firmness in treated peach fruits compared to the control samples. The lowest decay incidences also were found in treated fruits with microencapsulated essential oils. Hence, it could be concluded that postharvest treatment with microencapsulated essential oils has the potential to control decaying incidence, prolong storage life and maintained internal quality of peach fruits. Industrial application of these treatments needs the more experiments to found appropriated concentration and application methods.

**Keywords:** Peach Fruit, Microencapsulated Essential Oils, Post Harvest

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## Effect of Four Different Buffers on Browning Control of *Dracocephalum kotschy* Boiss Hairy Roots.

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The requirement for essential products of medicinal plants is growing due to large amount of using this metabolites in various fields such as pharmaceutical, make up fields or usage as additive, preservatives in food industry. *Dracocephalum kotschy* Boiss due to have flavonoids, phenolic and antioxidant compounds including Rosmarinic acid, has some Medicinal properties such as anticancer, antitumor and antibacterial effects. Therefore, plant breeders are trying to use new biotechnology techniques to increase their production and also reduce the production costs. In *D. kotschy* Boiss, it is possible to produce pharmaceutical compounds such as Rosmarinic acid by hairy root culture techniques. One of the main limiting factor and factors that inhibit growth of *D. kotschy* Boiss hairy roots is phenolic compounds that are secreted from the roots and cause browning so prevent hairy roots growth. So in order to resolve this problem, the effects of four different buffers on growth and inhibition of hairy roots browning were investigated in liquid medium. For this purpose, *D. kotschy* Boiss two weeks old leaves explants were used as explants to induce hairy roots by immersion. 15834 strain of *Agrobacterium rhizogenes* were used. Based on previous experiments, half strength MS used as hairy roots growth media. This experiment was conducted in a completely randomized design with eight treatments consisting PVP, Vitamin C, active charcoal and MES buffer that each of them was in two concentrations and ½ MS medium without any additives used as control. Fresh weight, Total Phenol, Total Flavonoid and Antioxidant Enzymes Activity were measured in all treatments. The ANOVA results showed that there are significant differences between treatments ( $P \leq 0.05$ ). results revealed that all the media containing buffering materials in comparison with the control were effective in reduction the browning of the hairy roots, but Performance of activate charcoal was more effective than the others. It is more effective on prevention of hairy roots browning by absorbing more phenolic compounds than the others. Also, by increasing the concentration of activate charcoal to 3 grams per liter, the fresh weight of the hairy roots was increased. The highest amount of browning was absorbed in the control treatment.

**Keywords:** *Agrobacterium rhizogenes*, Catalase, Phenolic compounds, Rosmarinic acid

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## The Absorption of Micro and Macro Elements, under Chemical Fertilizers in *Satureja Spicigera*.

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In order to investigate the effect of different levels of chemical fertilizers on *Satureja spicigera*, this research was conducted in Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran, in 2016. The experiment was conducted in the form of randomized complete block design with three replications. Treatments were N0P0K0, N50P50K25 and N100P50K50. Plots were 2 in 3 meters. The distance between the plots was 1 meter and the distance between the blocks was 1 meter too. Planting was carried out through transplantation. The harvest was done at flowering stage. Branches that dried in shade, used to measure the elements. Nitrogen, bromine, potassium, sodium, calcium and magnesium measurements were performed using Wahing et al., (1989) [1] method. Phosphorus measurements using Chapman & Pratt, (1961), method and iron, manganese, zinc and copper in the dry matter of the plant were measured and determined by the method of atomic absorption of flames through the Elmer (1982). Data analysis was performed using SAS and comparisons of the meanings using Duncan's test. Mean comparison showed that With the use of chemical fertilizers as 50 and 100 kg/ha, absorption of nitrogen from 130 kg/ha in the control treatment increased to 167 kg/ha in N100P50K50. The amount of potassium was the same, So, from 90 kg/ha of control, it reached 107 kg/ha at N100P50K50. The amount of iron increased from 2.2 kg in control to 3 at N100P50K50. The amount of zinc in the total biomass was about 0.3 kg / ha in N100P50K50. The results of this study showed that fertilizer had an increase in the absorbed elements. Chemical fertilizers can be used if the purpose of the medicinal plant is to increase with the elements.

**Keywords:** *Satureja Spicigera*, Absorbed Elements, Phosphorus, Potassium

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## The Effect of Potassium Nitrate and Gibberellic Acid on Seed Germination of Fennel (*Foeniculum vulgare* Mill) under Light and Darkness Conditions.

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*Foeniculum vulgare* Mill is a very famous and important medicinal plant in apiaceae family. This herbaceous plant contains useful phytochemical such as anethole, limonene, estragole, alpha-pinene, fenchone. The plant is used in pharmaceuticals and cosmetic industries. The plant has been used in traditional medicine systems from old time. It is used to improve disorders related to digestive, endocrine, reproductive, and respiratory systems (1). In general, seed germination of members of apiaceae family is low due to presence of some inhibitors in seed parts(2). The purpose of the study was to investigate effect of gibberellic acid (GA3) and potassium nitrate (KNO3) on germination of fennel seed in dark and light. Therefore, GA3 in four concentrations (0, 200, 400 and 600 mg/L) and KNO3 in three concentrations as 0, 0.1 % and 0.3 % was applied on seeds and treated seeds were kept in dark or light in ambient room temperature. The experimental design was completely randomized design in three replications. The statistical analysis were done using SPSS software. At the end of the experiments germination was assessed using parameters including mean germination time, germination percentage, coefficient of velocity, time spread of germination, root length, shoot length and fresh and dry weight. The results revealed that highest and lowest germination percentage were belong to 0.3 % KNO3 and GA3 600 mg/L respectively both in dark condition. The fresh weight of shoot (147.73 mg) and root (47.17 mg) was most in 0.3 % KNO3 in dark and least in GA3 600 mg/L in light. The germination velocity was 29.53 for 0.1 % KNO3 under light which was the maximum rate. In general it can be concluded that KNO3 in concentration of 0.3 % was the most effective germination treatment.

**Keywords:** Germination, Gibberellic acid, Potassium nitrate, Mean germination time

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## Evaluation of Antioxidant, Water Soluble Carbohydrate and Antocyanine Content of *Scorzonera tortuosissima* L. Indigenous of Southern South Khorasan Province.

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Natural products have shown interesting biological and pharmacological activities and are used as chemotherapeutic agents. These properties are due to the secondary metabolites and plants have historically been used in treating several diseases such as cancer [1,2]. Anthocyanins are members of a subclass of polyphenolic flavonoids and are responsible for the dark purple, blue and red colors of many fruits and vegetables. A number of studies have investigated the anthocyanin content and antioxidant activity of plant extracts. Carbohydrates were produced in plants through the process of photosynthesis. They are used either as energy sources for vegetative growth and development or as precursors in the biosynthesis of a wide range of molecules including lipids, proteins, and polysaccharides. *Scorzonera* is a kind of perennial asteraceae flowering plant with a widespread distribution in Europe, Asia and Africa. This type of plant contains more than 160 species in the world and the *Scorzonera tortuosissima* is one species which is grown in south Khorasan province. In this research, the extract of plant was done by Ultrasonic waves using 80% ethanol. Then, water soluble carbohydrate, antocyanin and antioxidant activity of ethanolic dried plant of *Scorzonera tortuosissima* were determined using spectrometric method.

**Keywords:** *Scorzonera tortuosissima* L., Antioxidant, DPPH, Carbohydrates

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## Response Surface Optimization of the Effect of Essential Oil on Peroxidase Enzyme Activity in Edible Vegetables.

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Peroxidase enzyme is one of the most important enzymes in plant tissue which can bind to hydrogen peroxide and produce an activated complex that can react with a wide range of donor molecules. Therefore inactivation of the enzyme may increase the shelf life of raw and un-blanching frozen vegetables. In order to inactivate the enzyme several physical and chemical treatments among them heating (blanching), lowering pH or aw or adding chemical additives can be used, however each of the above mentioned methods has a kind of shortcoming. Nowadays consumer's trend has been oriented to use fresh products or foods prepared by little process, therefore producers are interested the ways to increase the shelf life by use of alternative methods. In this study the effect of natural essential oils (cumin, fennel and clove oils) on peroxidase enzyme activity were investigated. Optimization of peroxidase enzyme inactivation under different variable (essential oils concentration and the time of enzyme activity) was performed using response surface methodology. Results indicated that red cabbage and cabbage has the highest and potato and lettuce has the lowest peroxidase activity respectively ( $p < 0.05$ ). Although peroxidase resistance to essential oils varied among different vegetables but clove, in all concentration had the best effects in decrease of peroxidase activity ( $p < 0.05$ ) whereas cumin and fennel were partially able to reduce the enzyme activity ( $p < 0.05$ ). Optimum conditions for non thermal inactivation of peroxidase enzyme of cabbage for different used oils were as: cumin concentration 50 ppm, the time of enzyme activity 60 second and enzyme activity (absorption) 0.186055, fennel concentration 50 ppm, the time of enzyme activity 60 second and enzyme activity (absorption) 0.179738 and clove oil concentration 50 ppm, the time of enzyme activity 60 second and enzyme activity (absorption) 0.154761 [1-2].

**Keywords:** Peroxidase enzyme, Response surface methodology, Essential oils

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**Cytotoxic Bioactive Triterpenoids from *Tripleurospermum disciforme* (C. A. Mey.) Schultz- Bip.**

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*Tripleurospermum disciforme* (C. A. Mey.) Schultz- Bip. belongs to the Compositae (Asteraceae) family. Known as “Iranian Babouneh”, it is a perennial herb that grows wildly to about 10-70 cm in height. The plant synonyms are *Chrysanthemum disciforme* (C. A. Mey.), *Matricaria disciforme* (C. A. Mey.) DC., *Chamaemelum disciforme* (C. A. Mey.) Vis. as well as *Chamaemelum disciforme* var. *quadrilobum* Boiss. The people of Iran use *T. disciforme* in the Iranian folk medicine (particularly in Hamedan and Mashhad provinces) to treat the coughs and febrifuges. Also, its decoction is traditionally used for treatment of kidney stone and acted as anti-spasmodic and anti-inflammatory agent. From that point of view, the phytochemical study of the dichloromethane (DCM) extract of *T. disciforme* was carried out by various chromatographical methods such as silica gel column chromatography (CC) and thin layer chromatography (TLC). Therefore, three triterpenes newly reported in *T. disciforme* including taraxasterol (1), lupeol (2) and betulinic acid (3) were isolated and elucidated by 1D <sup>1</sup>H-<sup>13</sup>C NMR and EI-MS spectral data compared with the previous data reported in the literature. Additionally, the cytotoxicity of obtained compounds were evaluated on AGS and WEHI-164 cell lines by MTT assay. Our results exhibited that 2 could be considered as an anti-tumor compound with IC<sub>50</sub> value of 3.2 μM on WEHI-164 cell lines. Likewise, 3 displayed potent cytotoxic activity, with IC<sub>50</sub> value of 5.6 μM on AGS cell lines. It is noteworthy to mention that *T. disciforme* lies in for further phytochemical and biological investigations due to the presence of valuable terpenoids.

**Keywords:** Asteraceae/Campositae, Betulinic acid, *Tripleurospermum disciforme*, Taraxasterol

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**The Effect of Electrical Conductivity of Nutrient Solution and Bicarbonate on Vegetative Growth of Watercress (*Nasturtium officinale*).**

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*Nasturtium officinale* L is a perennial plant that belongs to the family Brassicaceae. Due to the presence of numerous and effective chemical compounds such as flavonoid quercetin, beta-carotene carotenoids, lutein and zeaxanthin and vitamin C, the antioxidant properties of *Nasturtium officinale* L has been emphasized. For proper growth and fruit production, i.e., improved function, each plant needs strong vegetative growth and sufficient food supply. This proper growth is possible if the root absorb optimal amount of water and nutrients. For the purpose of the study, a factorial and completely randomized design experiment was conducted using 9 treatments with three replications in Shahed University. The treatments consist of EC nutrition solution at three levels (2.1, 1.4, 0.7 ds / m) and bicarbonate at three levels (0, 3, 6 mEq / L). The results of ANOVA showed that the presence of these treatments affected all the properties in such a way that EC2.1 ds/m and 3 mA / L bicarbonate treatment had the highest effect on the plant height. Moreover, fresh and dry weight of the plants was significantly affected by the treatments (P<0.01). The highest fresh and dry weight of the plant was observed in EC 2.1 ds / m and 0 mEq / L bicarbonate treatment. Furthermore, the highest root fresh and dry weight was observed in EC 2.1 ds / m and 0 mEq / L bicarbonate. The effect of nutrient solution EC and bicarbonate on root volume were significant (P<0.01) and the highest effect was observed in EC 2.1 ds / m and 6 mEq / L bicarbonate.

**Keywords:** Medicinal plant, Herbal nutrition, EC nutrition solution, Bicarbonate

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**The Effect of Salinity Stress on Seed Germination and Growth Parameters of Two Medicinal Plants, Black Cumin (*Nigella sativa*) and Basil (*Ocimum basilicum* L.).**

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Seed germination is the most sensitive stage to abiotic stresses in medicinal plants which are negatively affected by environmental conditions like salinity. In order to study the effects of salinity stress on germination, and some germination indices, a completely randomized design with three replications on two medicinal plants, Black Cumin and Basil was performed. The results of analysis of variance showed that different levels of salinity had a significant effect on germination percentage, germination rate, Kotowski coefficient, root and shoot dry weight, and shoot and root length. The results of the comparison showed that all of the above traits decreased with increasing salinity, so that the highest value of each of these traits was related to the control treatment and the lowest amount was related to 80 mM salinity.

**Keywords:** Germination, Medicinal Plants, Salinity, *Nigella Sativa*, *Ocimum basilicum*.

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**Effect of Mycorrhiza and Salicylic Acid on Yield and Yield Components of Anise Medicinal Herb.**

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Anise is widely used in the confectionery and beverage industry. Anise fruit essential oil has anti-bacterial properties. This essential oil is also used as a flavoring in the pharmaceutical industry. In order to evaluate the effect of mycorrhiza fungi and salicylic acid on yield and yield components of Anise, an experiment as a factorial form in a randomized complete block design with three replications in 2017 was conducted. The factors were included mycorrhiza fungi at three levels: control, *Glomus intraradices* strain and the using of *Glomus mosseae* strain and pretreatment seeds with salicylic acid for 12 hours at non-consuming levels (control), 100 and 200 mg/L. The measured traits included root length, stem length, plant dry weight, number of umbel, number of umbel per umbellate, number of seeds per umbel, thousand seed weight and seed oil percent. Based on the obtained results, the use of mycorrhiza fungus increased the quantitative and qualitative characteristics of the Anise which this increasing was higher in the treatment of *Glomus mosseae* mycorrhiza fungus. Pretreatment seeds with salicylic acid increased the measured traits in anise so that the most increasing was observed in the petiole of seeds with 200 mg/L salicylic acid. By considering the obtained results, it can be concluded that the using of mycorrhiza fungi and the pretreatment seeds with salicylic acid in anise will improve the growth of this medicinal plant.

**Keywords:** Essential Oil, Anise, Pretreatment, Mycorrhiza, Salicylic Acid

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## Analysis of Different Market Samples of “Booreh-e Armani”, a Mineral Compound Used in Iranian Traditional Medicine

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Booreh-e Armani (Booraq) is one of the mineral compounds prescribed in Iranian traditional medicine (ITM) alone of along with herbs in compound drugs as resolvent, cleaner, demulcent of spasmodic pain in the bowels, libido enhancer, etc. [1,2]. Recently, some sources have explained Booreh-e Armani as borax ore. The aim of this study was to analysis the amounts of Na<sub>2</sub>B<sub>4</sub>O<sub>7</sub>·10H<sub>2</sub>O (borax) in different market samples of Booreh-e Armani. Ten Samples of Booreh-e Armani were prepared from main grocery shops (Attari) of Tehran, Mashhad, and Shiraz. The percentage of borax in these samples was determined via titration by sodium hydroxide based on the method described in British Pharmacopoeia. Based on the results, the amount of borax in the samples was very different. Borax in some samples was about 40% while some samples have no borax. It means that grocery shops sell different things as Booreh-e Armani. The real nature of Booreh-e Armani is unknown and it is possible that it is not borax ore. Therefore, in this study distinguishing original samples from Counterfeits is impossible. More library studies on ITM manuscripts may clarify the real nature of this mineral. Trying to find the Armenian source of this mineral would also fruitful.

**Keywords:** Booreh-e Armani, Borax, Iranian traditional medicine, Titration

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## Evaluation of Biochemical Composition of Different Parts of *Echinophora Platyloba* at the Beginning of Flowering Stage.

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*Echinophora platyloba* is a medicinal plant from Apiaceae family that the aerial parts of it are used to food seasoning and in folk medicine to heal wounds and to treat gastric ulcers due to its anti-fungal, carminative, and digestive properties. Despite its industrial and traditional uses, few studies have been conducted on the secondary metabolites present in its various organs. Its anti-microbial, anti-cancer effects have been shown, recently. According to the results of researches based on the active substances content can be changed in the different parts of plants, phytochemical studies are necessary in this regard for its proper application. For this purpose, an experiment was conducted based on randomized completely design (RCD) with 7 treatments (different parts of the plant including upper leaf, lower leaf, stem, flower buds, flower, leaf and stem together, whole plant at the beginning of flowering) and three replications. The measured biochemical traits including flavone and flavonol, total flavonoid content, total phenolic compounds, antioxidant activity, total tannin content and total carbohydrate content. The results showed that the difference was significant between the treatments in terms of all the measured biochemical traits. flower buds had the highest amount of flavone and flavonol, total flavonoid content, total phenolic compounds, antioxidant activity, total carbohydrate and flavone and flavonol to flavonoid ratio, while the lowest flavone and flavonol content, total flavonoid content, flavone and flavonol to total flavonoid ratio and antioxidant activity was observed in lower leaf treatment. The highest amount of tannin was observed in whole plant at the beginning of flowering. According to the results of this study, it is recommended that the flowers are more suitable for pharmaceutical and industrial purposes.

**Keyword:** *Echinophora platyloba*, Flowering Stage, Biochemical Composition

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## Methods to Promote Germination of Dormant *Cassia Angustifolia* Seeds.

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*Cassia angustifolia*, also known as senna belong to Caesalpinaceae family. senna is a plant that is native to India. An experiment was conducted to determine the seed breaking dormancy methods in Medicinal Plants Research Center, Institute of Medicinal Plants laboratory. Study carried out on completely randomized design with 3 replications, treatments were Gibberellic acid (GA3) in two levels (500 and 1000 ppm) and KNO<sub>3</sub> in two levels (0.1 and 0.2 %). The results of the analysis of variance showed that different treatments had a significant effect on the germination percentage of the senna at 5% level. The results of comparison of mean of treatments showed that the percentage of seed germination of senna with potassium nitrate 0.2% was more than 80%.

**Keywords:** Dormancy, GA3 treatments, Senna, Seed

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## Chemical Composition, Antioxidant and Antiacetylcholine Esterase Activities of *Alcea officinalis* Flower Extract.

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Acetylcholinesterase (AChE) is the main enzyme for the breakdown of acetylcholine. Nowadays, usage of the inhibitors of this enzyme is one of the most important types of treatment of neurodegenerative diseases such as Alzheimer disease [1]. Herbal medicines can be a new source of inhibitors of this enzyme. The purpose of this study was to evaluate the phytochemical and antioxidant activity of the *Alcea officinalis* flower hydroalcoholic extract and its inhibitory effect on the acetylcholinesterase plasma enzyme. Gas chromatography-Mass spectrometry (GC-MS) to determine the chemical composition was used. Antioxidant activity was evaluated by 2,2-diphenyl-1-picrylhydrazyl (DPPH) method. Acetylcholinesterase inhibitory activity was estimated by Ellman method. Thirty-two components comprising 96.7% of the total extract were identified which most important compounds were 2,3- dihydro- 3,5- dihydroxy-6-methyl 4H-pyran-4-one (23.12%); 2,3-Dihydro-benzofuran (8.88%), 4-hydroxy-4-methyl 2-Pentanone (7.75%), 2- methyl 3- Pentanone (5.36%), 1,2- Benzenediol (5.12%). The extract showed DPPH IC<sub>50</sub> value of 1760.8 µg/ml and at the concentration 1mg/ml decreased the plasma acetylcholinesterase activity by 12.56% compared to control. The extract inhibitory activity was concentration dependent.

**Keywords:** *Alcea officinalis*, Composition, Antioxidant, Acetyl cholinesterase

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## Lysimetric Determination of *Hibiscus sabdariffa* Crop Coefficients During Different Growth Stages in Region of Birjand.

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*Hibiscus sabdariffa* L. is an annual tropical and sub-tropical herbaceous plant belongs to Malvaceae family. Red calyces of roselle are a source of anthocyanins (about 1.5 g.100 g dry weight<sup>-1</sup>), vitamin C and other antioxidants, such as flavonoids (gossypetine, hibiscetine, and sadderetine) (1; 2). Water is one of the most important factors limiting agricultural developments in arid and semiarid regions in the world. One of the important issues of water management is the assessment and determination of the water requirement of plants. Evapotranspiration is one of the main variables in calculating the water balance and ground level energy. Precise estimation of reference evapotranspiration (ET<sub>o</sub>) and crop evapotranspiration (ET<sub>c</sub>) on a daily basis is important to apply proper water system for crops grown. Moreover, to develop irrigation program, the awareness of crop coefficient and water requirement in different plant stages is essential. Therefore, this study was conducted to determine the crop coefficient of *H. sabdariffa*. A lysimeter experiment was conducted during a growing season at the Faculty of Agriculture, University of Birjand in 2017. For this purpose, three lysimeters were used and the water requirement of *H. sabdariffa* was calculated using water balance method. To calculate reference evapotranspiration, the grass used for green space with a height of 12 cm was used as reference plant. Finally, at the end of the growth season, the values of crop coefficients in the four stages of initial (30 days), development (100 days), middle (75 days) and end stages (35 days) for the *H. sabdariffa* plant were 1.26, 1.55, 1.81, and 0.96, respectively. Using these coefficients that have not been empirically presented are recommended for estimating the water requirement and managing the irrigation of the *H. sabdariffa*.

**Keywords:** Evapotranspiration, Lysimeter, Roselle

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## Effect of Biochar on Photosynthetic Pigments and Na and K Concentration of *Summer savory* (*Satureja hortensis* L.) under NaCl Salinity.

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Pyrolysis of waste organic materials by thermo chemical conversion under limited oxygen supply results in production of porous carbon-rich material, known as biochar [1]. Salinity stress limits plant growth and development by diversely affecting various physiological and mineral concentration of plants. Biochar can mitigate harmful influence of salinity on plants. Therefore, a pot factorial experiment based on completely randomized design with four replications was performed to evaluate the effect of biochar on photosynthetic pigments and Na<sup>+</sup>, K<sup>+</sup> and Na/K ratio of summer savory (*Satureja hortensis* L.) under irrigation with NaCl solution. Three salinity levels (0, 40 and 80 mM of NaCl) and three levels of biochar (0, 1, 2 % w/w of soil) were arranged. According to the results of this study the highest chlorophyll a and carotenoid content were observed at 80 mM NaCl with using 2% of biochar. However, the highest chlorophyll b and total chlorophyll content were observed at control plant (without salinity stress and biochar application) and as well as in treatment of using 2% of biochar without salinity stress, respectively. On the other hand by increasing NaCl concentration the concentration of Na<sup>+</sup> increased, but K<sup>+</sup> concentration and K/Na ratio were decreased in leaves summer savory. In total, application of biochar can reduce negative effects of salt to protect summer savory against NaCl stress.

**Keywords:** Biochar, Sodium chloride, Summer savory, Chlorophyll, Carotenoid

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## A Clinical Study on the Effect of *Zataria Multiflora* Essential Oil on White Blood Cell Count of Human Beings

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*Zataria multiflora* belonging to the Lamiaceae family is used in traditional folk remedies for its antiseptic, analgesic, carminative, anthelmintic and antidiarrheal properties. It has been shown that *Z. multiflora* has immune-stimulant, pain-relieving, antinociceptive, anti-inflammatory, antioxidant, antibacterial, antiviral, antifungal, hepatoprotective and scolicidal activities. Previous studies also have been revealed that this herbal plant has antidiabetic, antihyperglycemic and antihyperlipidemic and antileishmanial properties. The objective of the present interventional study was to evaluate the effect of the essential oil (EO) of *Zataria multiflora* on white blood cell count in human cases. This clinical study was performed at Shiraz University and Shiraz University of Medical Sciences, Shiraz, Iran, during 2016 to 2018. Fifteen participants were administered orally with *Z. multiflora* EO (60 mg daily) for 6 months (three 2-month periods with two weeks intervals). Hematological analysis was performed on the blood samples of the participants before and after treatment to assess the possible effects of the oil on their white blood cell count. No considerable difference was observed in the mean values of lymphocytes, basophils, neutrophils and eosinophils. Even though the number of monocytes decreased significantly after treatment ( $P: 0.045$ ), they were still in the normal range. Long time consumption of *Z. multiflora* essential oil has no apparent effect on white blood cell count in humans. However, further hematological investigations should be undertaken with more human cases in future to confirm the probable effects of *Z. multiflora* essential oil on white blood cells and other hematological factors of human beings.

**Keywords:** *Zataria multiflora*, Essential oil, White blood cells, Human

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## Evaluation of the Effects of Drought Stress on Germination Indices (*Silybum marianum*).

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*Silybum marianum*, belonging to Asteraceae family is one of medicinal plants used contributes to treat liver inflammation. the seed of this plant contains many chemical compounds, and the most important of which are Silybin, Silindianin, Silichristine, and Dihydrocylibin. drought stress is the most important limiting factor for plant production in arid and semi-arid regions of the world. considering germination as the most sensitive and important stage of plant life cycle, it is necessary to investigate plants performance in exposure to water shortages. Therefore, evaluation of different levels of drought stress on germination characteristics of *Silybum marianum* were investigated in a experiment laboratory with seven drought levels including zero (distilled water), -1, -2, -3, -4, -5 and -6 bar in three replicates in a completely randomized design at 26 °C. The results indicated that with increasing drought levels, the final percentage of germination, germination rate, germination rate and germination rate based on the time to reach 50% of germination, and germination rate coefficient decreased significantly and the average germination time required to reach 10, 50 and 90% of germination, and average germination time increased. In general, it concluded that *Silybum marianum* due to some internal mechanisms can tolerate drought and show suitable germination characteristics. in general, *Silybum marianum* are doesn't tolerated by drought from -5 times the germination percentage is significantly reduced of the 25 seeds in Petri, only one-fifth of it was able to sprout also, the germination process was prolonged but up to -4 times, although the duration of germination was prolonged, but all the seeds were able to germinate.

**Keywords:** 50% germination, Drought Stress, Germination Rate

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## Investigating the Effect of Different Types and Concentrations of Hormone on Regeneration and Proliferation of *Crataegus microphylla*.

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Hawthorn (*Crataegus microphylla*) is a tree with medicinal and ornamental aspects. Due to having bioflavonoids and anthocyanins, Hawthorn has a great importance in pharmaceutical industry. valuable active ingredients of this tree is beneficial in treating heart disease, hypertension, and infections. Seeds of Hawthorn are recalcitrant and seedlings has slow growth that need times over several years so tissue culture method is used to propagate Hawthorn, because this way helps to reduce the time of its growth. The aim of this study was to investigate micropropagation of hawthorn medium. In order to prepare plant samples, After collecting and cutting the lateral buds, explants were disinfected with 10% sodium hypochlorite for 15 minutes and 70% ethanol for 30 seconds. Then, the explants were cultured in MS culture medium containing Benzyl Adenine and 2-4-D in 12 different concentrations. For the proliferation part, the explants were transferred to medium containing BA and IBA with 16 treatments. The results of comparison of two regeneration and proliferation experiments showed that MS medium supplemented with 39.96  $\mu\text{mol}$  BA and 4.53  $\mu\text{mol}$  2-4-D had highest regeneration rate, and medium supplemented with 6.600  $\mu\text{mol}$  BA and 1.225  $\mu\text{mol}$  IBA showed the highest rate of proliferation. proliferation is a important part of tissue culture of Hawthorn, because most of the time the regenerated plants going to browning. In this research proliferation step has been successfully completed.

**Keywords:** Hawthorn, Proliferation, Regeneration

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## Meiotic Behavior of *Glaucium Grandiflorum* (Papaveraceae) an Important Medicinal Plant.

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The Papaveraceae family is one of the most important alkaloid containing families. It contains isoquinoline alkaloids including aporphines, protopines, protoberberines and proaporphines [1]. The genus *Glaucium* (Papaveraceae) comprises about 25 species of herbaceous plants in the world and Aporphinoids are the greatest number of isolated alkaloids from this genus. The genus is native to Europe, north Africa, and southwest and central Asia. The species commonly occur in saline habitats, including coasts and salt pans. The genus *Glaucium* is represented by 12 species in Iran including *G. calycinum*, *G. contortuplicatum*, *G. corniculatum*, *G. elegans*, *G. elegantissimum*, *G. fimbriigerum*, *G. flavum*, *G. grandiflorum*, *G. haussknehtii*, *G. mathiolifolium*, *G. oxylobum*, *G. paucilobum* and *G. pulchrum* [1]. In this study meiotic analysis of Sarcham (Ardabil province) population of this species was performed. Young buds were collected at different stages during flowering season. The flower buds which were collected are suitable for meiotic studies, due to containing pollen mother cells which leads to produce pollen grains. Ploidy level, chiasma frequency, and distribution as well as chromosome associations were investigated. Chromosome number of this species is  $2n=2x=12$  which is reported for the first time in Iran. Pollen fertility and meiotic aberrations such as stickiness, laggard chromosomes, anaphase bridge, disorganized chromosome and also micronucleus formations were investigated.

**Keyword:** *Glaucium grandiflorum*, Meiotic behavior, Chromosome number

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**Consideration of *Scrophularia striata* Fast-growing Cells as a New Potential for Acteoside Production and Responsive to Methyl Jasmonate.**

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In the present study, cell growth, acteoside production and activity and gene expression of phenylalanine ammonia-lyase (PAL) in *Scrophularia striata* cell cultures was investigated with a view to increasing the acteoside by methyl jasmonate (MeJA). Regarding MeJA, its concentrations and exposure time were factors that strongly affected the production of acteoside. 0.1 mM MeJA induced the highest increase of acteoside ( $34.63 \pm 2.3 \mu\text{g g}^{-1}$  cell fresh weight) which was 2.5-times greater than the untreated control at 48 h after elicitation. The highest activity of PAL of treated cells increased by 1.5 times of the control ones at 48 h after 0.1 mM MeJA elicitation. Induction of significant increase in the expression of *PAL* gene started 24 h after the elicitation and reached a peak at 48 h. The results from this study suggest that exposure with MeJA regulated directly the expression of *PAL* gene and finally, increased the production of acteoside and stimulated the excretion of acteoside into the culture medium. Results provide evidence that the level of MeJA used in this study increase the production of acteoside via the up-regulation of the *PAL* in *S. striata* cell cultures, and suggest that such selective actions of elicitors on the phenylethanoid glycosides synthesis will lead to more efficient metabolic engineering-based production of acteoside and using *S. striata* cell cultures.

**Keywords:** Acteoside, Methyl jasmonate, Phenylalanine ammonia-lyase, Phenylethanoid glycosides,

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**Study of Phytochemical Constituents, Antioxidant and Butyrylcholine Esterase Activities of *Narcissus tazetta* Flower Extract.**

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There are two types of acetylcholine esterase in the blood. The main type acetylcholinesterase (erythrocyte cholinesterase) is found mainly in chemical synapses and red blood cell membranes. The other type is butyrylcholinesterase (plasma cholinesterase) is found mainly in the blood plasma [1]. The objectives of this study were to evaluate the phytochemical and antioxidant activity of the *Narcissus tazetta* flower hydroalcoholic extract and its effect on the plasma butyrylcholine esterase activity in vitro. Compounds present in the flower extract were identified by Gas chromatography- Mass spectrometry (GC- MS). Antioxidant activity was evaluated by 2,2-diphenyl-1-picrylhydrazyl (DPPH) method and choline esterase activity was estimated by Ellman method [2]. Forty compounds comprising 93.2% of the total extracts were identified which most important compounds were 1-Octadecanol (16.39%), 12, 15-Octadecatrienoic acid, ethyl ester (15.30%), Linoleic acid ethyl ester (14.82%), Tetradecanoic acid, ethyl ester (10.25%) and Trans- phytol (10.18%). DPPH IC<sub>50</sub> value was observed 771.43  $\mu\text{g/ml}$  for *Narcissus tazetta* flower extract and at the concentration 1mg/ml increased the plasma cholinesterase activity by 55.46% compared to control.

**Keywords:** *Narcissus tazetta*, Composition, Antioxidant, Butyryl Cholinesterase

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## Morpho-Physiologic Responses of Iranian Population of *Thymus kostchyanus* under Saline Irrigation.

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Endemic plants because of acclimatization has relative tolerant to Environmental adverse conditions. *Thymus kostchyanus* as an indigenous species of IRAN with valuable volatile oil including of thymol and carvacrol. *T.kostchyanus* is grow up in salty and semi-arid climate Recent studies have showed that Thymus species have strong antibacterial, antifungal, antiviral, ant parasitic, and antioxidant activities. Salinity may also cause ionic imbalance and toxicity. Because substrate salinity fluctuates through the growing season, a plant may be exposed to different salinity levels, at various stages of development, with potentially significant consequences on population dynamics. In order to evaluation of saline irrigation on morphologic and physiologic responses the seeds of *T. kostchyanus* were collected from Kourdestan province and planted in pot and transferred to greenhouse. The study was conducted in completely randomized block design with tree replicates. After 10 months of germination the long term salt stress (21 days) was done via irrigation by saline water in four levels (0, 50, 100, 150 mM). The salinity effect was investigated on Plant high, Root length, Seed length, Seed width, Fresh and Dry weight, Dry matter percentage, SPAD Chlorophyll Meters, proline content, Total protein and Catalase, Gayacul, polyphenol oxidase activities. The results showed that the salinity has significant effect on all of traits except of Dry matter percentage. By increasing of salinity the morphologic characteristics of *T. kostchyanus* were limited or reduced. Also salinity decreased the SPAD value. In other hands by increasing of salinity up to 100 mM the Proline content, total protein, Catalase, Gayacul, and polyphenol oxidase activities were intensified, but in 150 mM salinity the enzymes oxidative activity were reduced. The results of this study reviled that the *T. kostchyanus* has relative tolerance to salinity.

**Keyword:** Abiotic Stress, Salinity, *Thymuskostchyanus*

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## Effect of Cinnamon Extract on the Carotenoid Content of Persimmon Fruit During Storage Time.

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Fruit coating with edible materials is a suitable way for preserving quality characteristic. The aim of the present study was to evaluate the effects of different concentration of cinnamon extract (0, 35, 70 %) at 4°C on carotenoid compounds content during storage times (0, 10, 20 days) of persimmon fruit. Results showed that Increasing the concentration of cinnamon extract increases the amount of carotenoids as the storage time increases, the carotenoid content of persimmon samples decreased. The lowest amount of carotenoids was observed for control samples on the twentieth day of storage time and the highest amount of carotenoids were in samples coated with 70% cinnamon extract on the third day of storage (p<0.05). It seems the cinnamon plant could be considered as a natural preservative in persimmon fruit and pharmaceutical purposes [1].

**Keywords:** Edible coatings, Persimmon fruit, Cinnamon extract, Storage life

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## Phytochemical Screening and Quantitative Analysis of Hydroalcoholic Extract of *Quercus infectoria* Galls.

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Galls of *Q. infectoria*, a medicinal plant of family Fagaceae that commonly grows in Asia are used for treat wound infections, dental applications such as gingivitis, diarrhea, hemorrhagia, etc. The aim of this study is to evaluate constituents of *Q. infectoria* galls from Kermanshah province. shade-dried Galls were collected from Kermanshah province, Iran and identified by a botanist. galls were crushed and macerated in 50-50 hydroalcoholic solvent for two days at room temperature. The concentrated brown extract was obtained using rotary. Primary phytochemical tests were performed to confirm existing of tannin, phenolic compounds, alkaloids, flavonoids and saponins using standard procedures. Total phenols (Folin-Ciocalteu method) and total flavonoids were also measured. In addition, gallic acid content of *Q. infectoria* was assessed by High-performance liquid chromatography. Phytochemical analysis of the extract showed the presence of tannin, phenolic compounds, alkaloids, flavonoids and saponins. Amount of the total phenols and total flavonoids were 35.23 and 22.05 mg/g plant respectively. The gallic acid content of *Q. infectoria* hydroalcoholic extract was 0.73 mg/g plant. According to this study *Q. infectoria* has a potential for antibacterial and antioxidant activity due to tannin, phenolic compounds, alkaloids, flavonoids and saponin compounds.

**Keywords:** *Quercus infectoria*, Galls, HPLC, Total phenols, Total flavonoids

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## Leaves and Flowers of Tussilago Farfara from Seven Region of Iran as a Source of Antioxidant and Phenolic Compounds.

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*Tussilago* is a monospecific genus from Asteraceae family Asteroideae subfamily [1]. It is an important worldwide medicinal plant. *T. farfara* distributed in wet mountainous regions of Iran, such as Azerbaijan, Tehran and northern provinces. Avicenna Persian polymath in Canon mentioned *T. farfara* for cough and shortness of breath treatment. *T. farfara* leaves and flowers have expectorant activity and are used for chronic dry cough and various pulmonary diseases [2]. The extracts of *T. farfara* were shown to exhibit various activities, such as antioxidant and antimicrobial activity. In this study the leaves and flowers of this plant were collected from seven major regions of Iran including Chalous Road, Damavand, Firoozkooh, Nur, Deylaman, Kaleybar and Namin. Methanolic extracts of 5 grams of leaves and flowers were prepared with Sonication. DPPH method has been used to evaluate the antioxidant activity, and the IC<sub>50</sub> was used to compare the antioxidant properties. The phenolic contents of different extracts were determined by Folin-Ciocalteu method and the aluminum chloride method was used to measure total flavonoid. Comparison of antioxidant activity of different extracts from leaves and flowers of collected ecotypes showed that the most antioxidant activity was related to leaf extract of Nur ecotype with IC<sub>50</sub> 55 ug/mg close the BHT (33 ug/mg) as a synthetic and industrial antioxidant. The least amount of this activity is related to Kaleybar ecotype flower extract with IC<sub>50</sub> 935 ug/mg. The leaf extract of the Nur ecotype showed the highest total phenol content with 366 mg GAE/ g Dry extract. The leaf extract of Namin showed the highest total flavonoid content with 47 mg QE/g. Study of antioxidant activity in different habitats shows that Nuor habitat is a suitable place for the cultivation of *T. farfara* to increase the amount of phenolic compounds and antioxidant activity.

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## Chemical Composition, Antioxidant Activity of *Thymus Kotschyanus* Extract and Its Effect on the Serum Paraoxonase (PON1) Activity.

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Serum Paraoxonase1 is an antioxidant enzyme which synthesized by the liver. This enzyme specifically attaches to HDL-c and prevents lipid oxidation. It is believed that antioxidant compounds increase paraoxonase activity [1,2]. In present study, chemical composition and antioxidant activity of hydroalcoholic extract of *thymus* from Lorestan province and its effect on serum paraoxonase activity were investigated. *Thymus* hydroalcoholic extract was prepared by Maceration method. Antioxidant activity was evaluated by 1,1-diphenyl-2-picryl-hydrazyl (DPPH) method. Extract compounds were identified using a gas chromatograph equipped with a GC-MS spectrometer. The effect of different concentrations (10-1000 µg/ml) of extract on paraoxonase activity was evaluated spectrophotometrically. Thirty-seven components comprising 95.9% of the total extract were identified, of which 1,2-Benzenediol (11.6%), 2-Methoxy-4-vinylphenol (9.75%), 2(3H)-Furanone, dihydro -4-hydroxy (8.05%), Hydroquinone (7.79%), 2,6-dimethoxy Phenol, (7.50%) and p-Cymene (6.53%) were found to be the main components. The extract showed DPPH radical inhibition with IC<sub>50</sub> value of 450 µg/ml and at the concentration 1mg/ml increased serum paraoxonase activity by 40% compared to control.

**Keywords:** *Thymus Kotschyanus*, Composition, Antioxidant, Paraoxonase activity

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## Evaluating the Production of Flavonoid and Phenol in Callus of *Crataegus microphylla*.

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Hawthorn (*Crataegus microphylla*) is one of the most valuable medicinal plants belongs to Rosaceae family, contains valuable active ingredients such as phenols, Flavonoids and anthocyanins . These compounds are produced in different parts of the plant and are not available in all seasons, because it is deciduous tree. Therefore, use of tissue culture methods provides the possibility of producing calls with higher content of flavonoid and phenol. The aim of this study was optimizing the protocol to production the callus of *Crataegus microphylla*, and also, was determining its flavonoid and phenol content. In order to optimize the culture medium of Callogenesis, MS medium supplemented with different concentrations of BA and 2,4-D hormones was investigated. After 8 weeks, the medium containing 4 µmol BA and 8.24 µmol 2-4-D and also medium supplemented with 12 µmol BA and 8.24 µmol 2,-4-D produced the calls with high quality and quantity. The results also showed that between the two selected treatments for evaluating phenol and flavonoid, culture medium supplemented with 4 µmol BA and 12 µmol 2-4-D had 57.86 mg flavonoid and 14.59 mg phenol per g of dry weight of callus that was richer than culture medium supplemented with 12 µmol BA and 8.24 µmol 2,4-D containing 14.27 mg flavonoid and 1.46 mg phenol per g of dry weight of callus.

**Keywords:** *Crataegus*, Phenol, Flavonoid, Callus.

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## Phytochemical Screening of *Scorzonera Tortuosissima* L. Indigenous of South Khorasan Province.

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Plants secondary metabolites such as phenolic, flavonoid and flavonol compounds are proven to have medicinal properties. Flavonoids as natural polyphenolic phytochemicals have long been associated with a variety of beneficial bioactivities important in cancer prevention and health promotion. These natural compounds are viable alternatives to conventional therapeutic drugs due to high potency and low systemic toxicity of them [1,2]. Therefore, the study of these compounds has considered great attention in recent years. *Scorzonera* is a kind of perennial asteraceae flowering plant with a widespread distribution in Europe, Asia and Africa. This type of plant contains more than 160 species in the world. One of the species is *Scorzonera tortuosissima* which is found in the area of Birjand. In this study, the plant was extracted by Ultrasonic waves using 80% ethanol as a solvent and total phenolic, flavonoids and flavonols compounds in ethanolic extract of *Scorzonera tortuosissima* were determined using spectrometric method.

**Keywords:** *Scorzonera Tortuosissima* L; Phenolic Compounds; Flavonoids Compounds

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## Elucidation of Phytochemicals and Toxicity Evaluation of Different Fractions of *Foeniculum vulgare* Mill Fruit Against Brine Shrimp Test (BST).

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*Foeniculum vulgare* Mill from Apiaceae Family, is native to the Mediterranean area also has been naturalized in many other regions and Iran is one of the most important producers of Fennel seed in the world (According to statistics reported by FAO, 2012). *Foeniculum Vulgare* Mill commonly called fennel has been used in traditional medicine for a wide range of ailments related to digestive, endocrine, reproductive, and respiratory systems in many parts of the world. Additionally, it is also used as a galactagogue agent for lactating mothers. Few extracts of *F. vulgare* and isolated compounds have been evaluated for several activities such as anti-allergic, anti-inflammatory, cytoprotection and anti-tumor. 5-methoxypsoralen isolated from methanolic extract of fennel showed strong inhibition with an IC<sub>50</sub> value of 18.3 μm for human liver cytochrome P450 3A4. In this research work, methanol extract of the mentioned plant was obtained by using soaking. In order to achieve effective fraction of the extract, column chromatography was performed; the sequential extraction was realized with four solvents of different polarities (methanol, chloroform, ethyl acetate, hexane) to achieve four fractions. Toxic activity of those fractions was evaluated against Brine Shrimp Test (BST). Results exhibit that this plant has significant toxicity and maybe a good resource for extracting anticancer compounds. In the following, phytochemical analysis by LC method such as Sephadex, reverse and silica gel column and TLC led to separation of several flavonoid in ethyl acetate fraction for the first time and separation of 2 secondary metabolites in chloroform and methanolic fractions.

**Keywords:** *Foeniculum Vulgare*, Cytotoxicity, Brine Shrimp Test, Isolation and Identification

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## The Effects of Different Levels Salinity on Esfand (African Rue), *Peganum harmala* Germination.

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The Esfand (African rue), *Peganum harmala* L. is a medicinal plant mostly found in South Asian countries, Middle East and different regions of Iran and is used as a folk medicine. Harmon, hamaline and harmalol are the alkaloids which are extracted from this plant and used as a central nervous system stimulant and psychoactive in humans. In Iranian folk medicine, the powdered seeds of African rue is used in skin and sub skin tumor therapy. Seed germination is a critical step in seedling establishment of a plant and is the successful step in following stages of life cycle. Adequate absorption of water is necessary for plant seeds turgidity and imbibing to germinate, therefore, water potential of the seed germination medium must not reduce to lower than a threshold level. By decreasing the matrix and osmotic potential of medium, the water absorption of seed will decrease and germination ability will reduce. Salinity stress effects on the seed germination via reducing the water potential and will toxifies by sodium and chloride ions and reduces the essential nutrition ions of plants such as calcium and potassium. To evaluate the effect of salinity stress on germination and seedling growth of African rue (*Peganum harmala*), a Laboratory experiment was conducted based on completely randomized design with nine treatments each in three replications in Agricultural college of University of Guilan in 2017. The drought levels include 0 (distilled water), 1, 2, 3, 4, 5, 6, 7 and 8 bar, were applied using sodium chloride (NaCl). Petri dishes were used as replications and 25 seeds were used per sterilized petri and were located in growth chamber adjusted on 18/25 °C night/day temperature with 14 hours light. The germination of the seeds were evaluated daily. Results showed that effects of salinity stress on percentage and rate of Germination, reciprocal for 50% germination (R50), cumulative time of 5%, 10%, 50, and 90% (D05, D10, D50 and D90) of germination indices were significantly different, but none of the mean germination time, mean daily germination, germination rate, coefficient of velocity of germination, mean germination rate and germination rate index were significant. The highest percentage and rate of germination was related to the control treatment (distilled water), and by increasing the level of drought stress, percentage and rate of germination reduced and the required time for 50% germination increased.

**Keyword:** Drough stress, Germination indices, Shoot length, Root length

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## The Antioxidant Activities and Total Phenolic of *Nitraria schoberi*.

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Consumption of plant derived antioxidant contributes to reducing risks of certain chronic and degenerative diseases. The aim of the present study was to study the antioxidant activities and total phenolic of *Nitraria schoberi*. *Nitraria* is a genus of flowering plants in the family Nitrariaceae, native to Europe, Asia, Russia and Australia. The species occurs from central to eastern regions of Iran, *N. schoberi* L is widely distributed in many sandy and saline areas in Kavir-e Meyghan (Markazi province). The objective of this study was to determine the total phenolic and flavonoid content and the antioxidant activity of a methanol extract of *N. schoberi*. Fruits of *N. schoberi* were collected from Meyghan region. The pericarp and seeds were separated from each other by hands. All samples of seed and pericarp were air-dried, and then grinded and were finally extracted by methanol: water (80: 20) for 24 h in room temperature and extracts were filtered also. Antioxidant activity of methanol extract of samples were analysed by 1, 1-diphenyl-2-picrylhydrazyl (DPPH) radical, methods. According to Hosu *et al* [1] the total phenolic content of the extract was determined and the total flavonoid content of crude extract was determined by the aluminium chloride colorimetric method. Results showed the total phenolic content of the methanol extracts of pericarp and seeds are 7.56 and 2.5 mg QE/g DW respectively meanwhile the total flavonoids are 6.47 and 1.54 QE/g DW for these two different parts. A significant antioxidant activity, i.e., mean percentage inhibition of DPPH radical was observed in pericarp and seeds of *N. schoberi* at the concentration of 0.55 mg (IC50) and 2.82 mg (IC50) respectively.

**Keywords:** Ethanol Extract; Total Phenol; Flavonoids; DPPH; *Nitraria schoberi*

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## The Effect of Bio-Fertilizers on Shoot Yield and Essential Oil of *Satureja Sahandica*.

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In order to investigate the reaction of *Satureja sahandica* to different bio-fertilizers, this experiment was conducted in Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran, in 2016. The experiment was conducted in the form of randomized complete block design with three replications. Treatments were including: control, *Glomus mossea*, *Glomus intraradices*, *Pseudomonas* stain 187, *Azospirillum*, *Thiobacillus*,  $S_{250}$  + *Thiobacillus*,  $S_{500}$  + *Thiobacillus* and Vermicompost (5 ton/ha) + *Thiobacillus*. Plots were 2 in 3 meters. The distance between the plots was 1 meter and the distance between the blocks was 1 meter too. Planting intervals were 40 cm long and between 50 cm lines. Planting was carried out through transplantation. The harvest was done at flowering stage. Branches that dried in shade, used to measure the flower shoot yield. The essential oil extraction was water distillation for 2 hours. The results of variance analysis showed significant difference between bio-fertilizers in flower shoot yield at  $P \leq 0.01$  and essential oil percent and yield at  $P \leq 0.05$ . The results of mean comparisons indicated that the highest flower shoot yield (4993 kg/ha) belongs to *Thiobacillus*,  $S_{250}$ . The highest essential oil percent (1/89%) and yield (82/6kg/ha) achieved from *Thiobacillus*,  $S_{500}$ . The results of this study showed that the use of sulfur soluble fertilizers has been effective in increasing the percentage and essential oil yield.

**Keywords:** *Satureja sahandica*, Essential Oil, *Thiobacillus*, Sulfur Soluble

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## The Effect of Carob Pods Extract on the Rats Testosterone Hormone.

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The carob is a local name of *Ceratonia Siliqua* L. from fabaceae family. It is habitat in southern area of Iran, Shahpour Kazeroun valley in Fars province. This plant is evergreen and really can adapt to severe environmental condition or harsh climate. Its plump brown pods have used as a traditional medicine, to treat against asthma, impotence and anti-diarrhea [1]. In this study, the carob pods were collected from the northwest of Kazeroun valley in November of 2016. The pods were dry at 50 °C and crushed into industrial mills. Then effective materials from pods powder were extracted with 70% ethanol solvent by soaking method (maceration) over 72 hours. After that 32 adult male rats were divided into 4 equal groups each with 8 rats. The three treatment groups received total carob pods extract with different quantities: 300, 600 and 900 mg per kg of rat weight. The extract effect on the level of testosterone was observed by peritoneal injection method after a period of 25 days. We the rats were anesthetized by ether and then performed blood sampling from their hearts. The blood serum samples were isolated to determine the quantity of hormones by chemiluminescence equipment. The analyzed data by SPSS software show significant increasing in different quantity of hormone for carob extract treated rats in compare with control group. On the other hand, the non-polar compounds were isolated by hexane solvent and the essential fatty acids such as: linoleic, linolenic and arachidonic acid were detected in extract with GC and GC/Mass equipment. The presence of these fatty acids could cause an effective event on the synthesis of cAMP-producing and the active other enzymes in Leydig cells. In addition, It could be increase the concentration of testosterone hormone in the rat [2].

**Keywords:** Carob, Testosterone, Rat, Fatty acids, cAMP.

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## Isolation and Identification of Compounds from *Alyssum homolocarpum* Seed Extract

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The Brassicaceae or mustard family is known as one of the most economically important groups of flowering plants. *Alyssum*, a famous genus of this family. Seed gum of *Alyssum homolocarpum* (Fisch. & Mayer) Boiss. (Brassicaceae), which exhibits pseudoplastic behavior, is used as a thickening agent or a natural stabilizer in food industries and pharmaceutical semisolid formulations. It has been used as traditional medicine for centuries. The seeds of *Alyssum homolocarpum* release a thick, slimy mass of polysaccharides once soaked and heated in water. The polysaccharide has been a natural remedy to treating illnesses such as lung infections, asthma, whooping cough, dry cough, and kidney stone. In this study, *Alyssum homolocarpum* seed extracts were investigated to elucidate its composition. In the following, phytochemical analysis by LC method (such as sephadex, reverse and silica gel column) and TLC led to separation of two flavonoids in chloroform and methanolic fractions for the first time.

**Keywords:** *Alyssum homolocarpum*, Isolation, Identification, Brassicaceae

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## Seed Germination of *Nepeta Kotschy* Boiss. Using Gibberellin and Potassium Nitrate under Light or Dark.

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*Nepeta Kotschy* Boiss. is a member of lamiaceae family and endemic for flora of Iran. Phytochemical profile of the plants contain valuable constituents such as 4 $\alpha$ ,7 $\alpha$ ,7 $\alpha$ -nepetalactone, 4 $\alpha$ ,7 $\alpha$ ,7 $\beta$ -nepetalactone and cubenol, geranyl acetate, nepetalactones, dehydronepetalactone, nepetalic acid, 1,8-cineole,  $\alpha$ -terpineol,  $\alpha$ -citral and geraniol. Traditionally, it has been used to ameliorate diseases such as fever, dysentery, septic sores, rheumatism, diarrhea, stomach ache, vomiting, skin diseases. Because this plant is wild so there is few information about its phenological stages or cultural requirements. This study was aimed to test seed germination of the plant under some conditions. To perform experiment GA3 (0, 200, 400 and 600 mg/L) and KNO<sub>3</sub> (0, 0.1 % and 0.3 %) were prepared and seeds were exposed to them for 24 hours. Then treated seed kept under light or dark. When germination stopped after two round of measuring the germination ability was measured using some parameters such as mean germination time, germination percentage, germination velocity, time spread of germination, root length, shoot length and fresh and dry weight. The experiment performed in completely randomized design with three replications. The SPSS software was used for data analysing. The result demonstrated that GA3 200 mg/L in light condition was most effective with 46.6% germination. However, the lowest germination (13.3 %) was obtained in GA# 200 mg/L under light condition. Maximum shoot length (4.9 cm) and shortest shoot (2.1 cm) were belong to control in dark and light conditions. Also, root length was most (3.47 cm) and least (1 cm) in GA3 600 mg/L in light and 0.1 % KNO<sub>3</sub> in dark. Similarly, other parameters were affected by treatments. In summary, GA3 200 mg/L in dark and GA3 600 mg/L in light and potassium nitrate 0.1 % improved the germination criteria.

**Keywords:** *Nepeta*, KNO<sub>3</sub>, GA3, Germination, Light

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## Evaluation the Effect of Emulsions Based on Silver Nanoparticles on the Persistence of *Salix aegyptiaca* L. Extract Beverage.

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Nowadays, nanotechnology has extensive applications in various industries such as medicine, medical, food and agriculture. The introduction of nanotechnology to agriculture and food industries has been increased the quality and longevity of the product along with the standards of health and environmental protection. In the beverage industry, emulsions basis of nano-compounds are used to increase the safety and persistence of various types of beverages and reduce the use of chemical preservatives. In natural beverages on the basis of medicinal plants, the use of some preservatives has changed taste and colour of the product; therefore, it requires replacement of them with a proper preservative. Accordingly, in current study, the effect of the use of silver nanoparticles for increased beverage persistence on the basis of *Salix aegyptiaca* L. extract, produced in the Saba Jelveh Company, was investigated at concentrations of 0.01, 0.25, 0.5 and 1 mL. After the formulation of nano-emulsion beverages, the shelf life of the products at a period of 3 and 7 days, 1 and 6 months and 1 year were compared with P, OSA, MRS and YGC media tests with the results of typical preservative citric acid beverages. The results revealed that in all beverages containing nanoparticles, the growth of microorganisms was totally negative; therefore, in samples 1 mL and 0.5 mL emulsion deposit was observed. Positive microbial growth was reported in pasteurized specimens containing citric acid in medium experiments and after three months. According to the results of this study and the high potential of nano-compounds in replacing conventional preservatives and after completion of toxicological studies, optimal concentrations of nanosilver emulsions can be used in beverages based on medicinal plants to increase product shelf life.

**Keywords:** *Salix aegyptiaca* L., Preserving emulsion, Beverages, Shelf life

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## The Effect of Chemical and Chemical and Organic Fertilizers on Growth Characteristics of *Satureja sahandica*.

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in order to investigation the reaction of *Satureja sahandica* to different levels of Chemical and organic fertilizers on Growth Characteristics of *Satureja sahandica*, this experiment was conducted in Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran, in 2016. The experiment was conducted in the form of randomized complete block design with three replications. Treatments were including control, manure 30 ton/ha, manure 60 ton/ha, vermi-compost 5 ton/ha, N50P25K25, N50P25K25M30, N50P25K25M60 and N50P25K25V5. Plots were 2 in 3 meters. The distance between the plots was 1 meter and the distance between the blocks was 1 meter too. Planting intervals were 40 cm long and between 50 cm lines. Planting was carried out through transplantation. The harvest was done at flowering stage. Branches that dried in shade, used to measure the flower shoot yield. the essential oil extraction was water distillation for 2 hours. The results of variance analysis showed significantly difference between fertilizers on flower shoot yield at  $P \leq 0.05$  and on essential oil percentage and yield at  $P \leq 0.01$ . The results of mean comparisons indicated that the highest flower shoot yield (4100 kg/ha), essential oil percentage (2.07%) and essential oil yield (111.08 kg/ha) belongs to N50P25K25M60.

**Keywords:** *Satureja Sahandica*, Essential Oil, Manure, Nitrogen





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## Rosmarinic Acid and Related Phenolics in Hairy Root Cultures of *Dracocephalum kotschy*.

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The *Dracocephalum* genus belongs to the Lamiaceae family, *Dracocephalum kotschy* is one of the important endemic species and is distributed in many parts of Iran. *D. kotschy* in traditional medicine are used as carminative and tonic as well as for the treatment of ailment such as congestion, headache, stomachache and liver diseases. It is one of the constituents of Spinal-Z, a traditional Iranian anticancer remedy, which was used by traditional healers as a plant concoction for the treatment of many forms of cancer in humans. In recent years, it has been reported that neuroprotective and immunoinhibitory effects of the plant are due to its methoxylated flavonoid, calycopterin. Furthermore, methoxylated flavonoids of the plant enhance selective tumour inhibition and confirm the anticancer activity of this plant species. Rosmarinic acid (RA), another major component of this plant, is an ester of caffeic acid and 3,4-dihydroxyphenyllactic acid. RA has shown antioxidant, anti-virus, antimicrobial, anti-allergic, anti-inflammatory and anticancer activities. It also possesses promising physiological actions related to cognitive performance such as prevention of Alzheimer's diseases, treatment of kidney disease, cardio protection and cancer chemo prevention that are found in the plants of Lamiaceae family. Many valuable medicinal compounds are found in plant roots; root systems play an important role in determining the temporal and spatial patterns of the activity and synthesis of macromolecules. Hairy root cultures in hormone-free system is stable and has a high production rate. Rapid growth, low doubling time, easy maintenance and the ability to synthesize a wide variety of chemical compounds, are some of the advantages that have made hairy roots as an important source for the production of secondary metabolites. The hairy roots of *D. kotschy* induced by infection with *Agrobacterium rhizogenes* 15834 and their capacity to biosynthesize RA and surface flavonoids was studied. The HPLC analysis confirmed the presence of RA in tested samples according to the same retention time of 5.34 min as standard. The highest amount of RA was produced in transformed roots and related phenolics in most hairy root lines, were higher than the nontransformed roots. The obtained results show that the ability of secondary metabolite synthesis in hairy roots is much higher than the wild type roots and production of secondary metabolites from hairy roots is more stable compared to other types of cell cultures.

**Keywords:** *Dracocephalum kotschy*, *Agrobacterium rhizogenes*, Hairy roots, Rosmarinic acid

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## Evaluation of Anti-Inflammatory Activity of Hydro Alcoholic Extract of *Ocimum basilicum* Seeds in Mice.

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*Ocimum basilicum* also called great basil or Saint-Joseph's-wort, is a plant from Lamiaceae family. For leaves, stems and seeds of this plant have been suggested many pharmacological and traditional activities. Extract of 108g of powdered *Ocimum basilicum* Seeds were prepared at room temperature with ethanol 70% according to maceration method under 4 h shaking. The extract was kept in refrigerator until the experimentation. Anti-inflammatory effect of extract was evaluated with the acetic acid test. In the acetic acid test, 0.3 ml acetic acid (1%) was intraperitoneally injected. At first, mice received extract and indomethacin and after 20 min acetic acid were injected. The number of writhing was counted in first, second and third 10 min post-acetic acid injection. After doing a dose-response between 5 doses (50, 100, 200, 400, 800 mg/kg), 2 doses 200 and 400 were selected. At this experiment, mice were divided into 4 groups. Group one to four were received normal saline, extract with 200 and 400 mg/kg dose, Indomethacin (10 mg/kg). The obtained data was analyzed by SPSS software (version 16, USA). In this study, the Anti-inflammatory effect of the hydro alcoholic extract of *Ocimum basilicum* were examined according to the method described. The extract was reduced the number of writhing. Based on the mean of writhing in mice in first, second and third 10 min after injection of acetic acid it was concluded that the extract has a good anti-inflammatory activity.

**Keywords:** *Ocimum basilicum*, Anti-Inflammatory, Acetic Acid



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## Biosynthesis, Characterization and Antibacterial Capability of Silver Nanoarticles Using Aqueous Extract of *Fumaria Officinalis*

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Synthesis of metal nanoparticles (NPs) and their characterization has been an emerging field of nanotechnology since the past few decades because of their unique properties and potential in the fields of physics, chemistry, biology and medicine. Recently, silver nanoparticles (Ag NPs) have emerged as encouraging bactericidal agents, and have been widely applied in various fields of industry such as cosmetic, textile, medical and food industry. Ag NPs are being extensively synthesized using plant extracts, although very little is known about the exact mechanism for this biogenic synthesis. However, recent researches have revealed that the biologically active compounds of plant extracts such as phenol, protein and flavonoids play an important role in the reduction of metals ions and capping of the biosynthesized nanoparticles. In the present study, silver nanoparticles were synthesized using aqueous leaves extract of *Fumaria officinalis* and the production of AgNP's was confirmed by the absorption spectrum of  $\lambda$  max at 425 nm. The particle size of the AgNPs was studied by TEM and showed the presence of AgNPs in the size range 20–45 nm. The FTIR studies show the presence of various functional groups such as NH<sub>2</sub>, OH, C=O groups, which are responsible for the reduction process. The XRD peaks 38°, 44°, 64°, and 77° for leaves extract can be assigned the plane of silver crystals (111), (200), (220), and (311), respectively, and indicate that the silver nanoparticles are face centered cubic (FCC), and crystalline in nature. The Disc diffusion method was followed to observe the bactericidal activity. The aqueous leaves extract of *Fumaria officinalis* shows moderate antibacterial activity against gram-negative bacteria, while the green synthesized silver nanoparticles shows a potential bactericidal activity against both gram-positive and gram-negative bacteria studied in the present investigation. The standard antibiotic amoxicillin was used as positive control and 1% DMSO were used as negative control. The bioactive compounds such as tannins and phenolic compounds present in the aqueous extract and the nanoparticles capped with the bioactive compounds of plant material are responsible for the bactericidal activity. Further studies on characterization of specific compound responsible for the killing of bacteria, resulted in the invention of new compound to control the drug resistance organisms.

**Keywords:** *Fumaria officinalis*, Silver nanoparticles, XRD, Disc diffusion, Drug resistance

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## Carbomer Microgels for Colon Drug Delivery of Peppermint Oil: a Swelling Study.

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Positive effects of essential oils especially peppermint oil (PO) has been previously reported in relieving the symptoms of irritable bowel syndrome (IBS) or spasmodic signs of colon diseases. However, application of multiparticulate drug delivery systems for specific delivery of pharmaceuticals to colon is a very recent approach. Here, the PO's (Barij Essence, Iran) components were determined as menthol (49.96%), menthone (18.69%), menthyl acetate (4.39%), menthofuran (11.81%), eucalyptol (3.13%) and pulegone (2.55%) by peak area of GC-Mass signals. PO was loaded in Carbomer 934p (Corel-pharmachem) microparticles, as a pH-responsive drug carrier, by immersing of 100 mg in PO for 32h at room temperature. Dynamic and equilibrium swelling ratio of the microgels were studied according to an in-house developed method. The PO-loaded microgels were used for preparation of pellets made by wet process including granulation and particle sieving. The particles were coated by Eudragit L100 (Evonic) with an in-house developed coating method. The results of dynamic swelling studies showed that the swelling profile levelled off after a period of 8 hours. The swelling data was well-fitted by Berens-Hopfenberg model which is a Voigt-based equation [3]. Maximum loading for all the components with regard to percentage of PO's component in the pellets was calculated as 17 %wt/wt according to extraction and consequent GC-MS analysis. Drug release experiments were performed in simulated gastric and intestinal fluids. The results showed that about 4% of the PO released in intestinal medium which supports the capability of the device for colon delivery of PO.

**Keywords:** Peppermint oil, Carbomer, Swelling, Colon drug delivery, Pellets

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## Essential Oil Content and Constituents of Sour Orange (*Citrus aurantium*) at Different Fruit Ripening.

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Sour Orange (*Citrus aurantium*) is the plant belongs to Rutaceae family. This plant is herbaceous perennial, evergreen and fragrant essential oils of flowers and fruit Pharmaceutical uses. In Iran and in the world, research has been carried out on the changes in the essential oil components and phenolic compounds of other citrus species during ripening stages, but no reports have been made regarding the orange fruit. In this research, the effect of the different stages of peel fruit ripening on essential oil content and components were studied. For this study, an experiment with four treatments and three replications in a randomized complete block design (RCBD) consist of different stages of fruit maturity: immature fruit (green color), semi mature (green-orange), mature fruit (orange color) and over-ripe fruit (semi dark orange color). The essential oil was extracted by Clevenger type apparatus and oil composition was identified by GC and GC/MSS. The results showed significant different of treatments on measured factors. The maximum and minimum essential oil (10.30% and 3.13%) related to immature and over-ripe stages respectively. While the highest and lowest levels of limonene, as the major component of the oil (94.18-96.09%) were determined in ripe (orange color) and immature fruit (green color), respectively. But the greatest performance in the immature stage (the green) was observed. Totally, the results showed determination the best harvest time had important role in active substance quantity and quality.

**Keywords:** Essential oil, Limonene, *Citrus aurantium*, Harvesting time.

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## Antioxidant Activity and Phenolic Content of *Echinophora platyloba* at the End of Flowering Stage.

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*Echinophora platyloba* belongs to Apiaceae family and aerial parts are used as additive spice to yogurt and cheese. Despite the traditional use and dietary and pharmacological studies on *Echinophora* sp. no attempt has been made to isolate secondary metabolites. Therefore, it seems that the phytochemical study is necessary for plants proper application. Also, obtaining information on the relationship between the stage of growth of the plant and its various organs with the production of secondary metabolites can determine the best plant's harvest time. For this purpose, an experiments based on randomized complete block design (RCD), with six treatments (different parts including leave+stem, flower, fruit, flower+seed, flower+Leave+stem, fruits+Leave+stem) and three replications. The most important biochemical traits measured including Flavon and flavonol, total flavonoid, Total phenolic compound and antioxidant activity. The results showed significant difference between treatments related to measured factors except antioxidant activity. Flower+seed organs had the highest rate in terms of biochemical traits of the extract (Flavon and flavonol, total flavonoid, Total phenolic compounds and antioxidant activity). The maximum flavone and flavonol (2.79 mg quercetin/g dry weight), total flavonoide (12.08 mg quercetin/g dry weight) and total phenol (0.23 mg gallic acid/g dry weight) was observed on flower+seed treatments. While the minimum content regard to all biochemical factors was determined in leav+stem organs. Totally, its seems in this plant flower and seed accelerate their synergetic effects from biochemical factors.

**Keywords:** *Echinophora platyloba*, Phenology, Total phenolic, Antioxidant activity

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## Effect of Low Irrigation Stress on Yield and Yield Components of Sesame.

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Sesame seed is one of the first crops processed for oil production. Its non-culinary application includes its use as an ingredient in soap, cosmetics, lubricants and medicines. Sesame seeds also contain two unique substances: sesamin and sesamol known to have a cholesterol lowering effect in humans and to prevent high blood pressure. The crop growth and development are constantly influenced by environmental conditions such as stresses which are the most important yield reducing factors in the world. Drought stress is considered as one of the crop performance limiting factors and a threat for successful crop production (Dennis, 2000). In order to study the response of sesame cultivars in terms of yields and yield components to different irrigation regimes (full and low irrigation conditions), a field experiment was conducted in a split plot trial based on randomized complete block design with three replications during 2016. In this experiment two factors including irrigation regimes (main factor) and sesame cultivars (sub factor) were examined. Irrigation regimes in two levels, including irrigation after depletion of 40% and 80% of soil available water (full and low irrigation, respectively) in the main plots and 6 sesame cultivars in sub plots were considered. The subplots attributed to six sesame cultivars including Halil, Dashtestan 2, Darab 1, Oltan, Yellow White and Naz Tak Shakhe. Sesame sown in June and 120 days after planting, grain yield of sesame was harvested. The results showed that low irrigation stress reduced the majority of traits. The interaction of irrigation and cultivar on seed yield, harvest index, capsule and seed number per plant and 1000-seed weight were significant. Among the studied traits, grain yield showed the highest reduction (60%). Among the studied cultivars, Oltan and Dashtestan had the highest yield in the conditions of full irrigation. These cultivars also had the highest capsule number, number of grain per capsule and thousand grain weight. None of the studied cultivars had desirable performance in the low irrigation conditions. As a general principle, it can be concluded that in selecting the irrigation treatment it is necessary to pay attention to the characteristics of the cultivars especially for the tolerability of cultivars to drought stress and to adjust the water availability in such a way that plants use the environmental factors, the competition between the plants is minimized and the maximum economic yield is achieved.

**Keywords:** Irrigation, Sesame Cultivar, Water stress

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## The Effect of Chemical, Organic and Bio- Fertilizers on Growth Characteristics of *Satureja Bachtiarica*

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in order to investigation the reaction of *Satureja bachtiarica* to different levels of Chemical, organic and bio fertilizers on growth characteristics, this experiment was conducted in Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran, in 2016. The experiment was conducted in the form of randomized complete block design with three replications. Treatments were including control, manure 30 ton/ha, manure 60 ton/ha, vermi-compost 5 ton/ha, N50P25K25, N50P25K25M30, N50P25K25M60, N50P25K25V5, *Glomus mossea*, *Glomus intraradices*, and *Pseudomonas stain 187*, *Azospirillum*, *Thiobacillus*, S<sub>250</sub> + *Thiobacillus*, S<sub>500</sub> + *Thiobacillus* and Vermi-compost (5 ton/ha) + *Thiobacillus*. Plots were 2 in 3 meters. The distance between the plots was 1 meter and the distance between the blocks was 1 meter too. Planting intervals were 40 cm long and between 50 cm lines. Planting was carried out through transplantation. The harvest was done at flowering stage. Branches that dried in shade, used to measure the flower shoot yield. The results of variance analysis showed significantly difference between fertilizers on growth characteristics. The results of mean comparisons between macro fertilizers indicated that the highest flowering shoot yield per plant (39.5g), flowering shoot yield (1952 kg/ha) and canopy (33.81 cm) belongs to M30. The results of mean comparisons between bio fertilizers indicated that the highest flower shoot yield (1422 kg/ha) belongs to Vermi-compost. The highest canopy (22.81cm) and Height (41.75cm) achieved too.

**Keywords:** *Satureja bachtiarica*, Manure, Nitrogen, Canopy



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## Analysis and Characterization of Volatile Composition of Essential Oil from *Haplophyllum glaberrimum* Bunge.

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Characterization of chemical composition of essential oil content of aerial parts of *Haplophyllum glaberrimum* Bunge collected from Kazeroon was taken up in the present work. The essential oil samples were prepared via hydro-distillation using a Clevenger type apparatus. Following dehydration process by anhydrous Na<sub>2</sub>SO<sub>4</sub>, samples were injected into a Gas chromatograph attached to a Mass spectrometer apparatus (GC/MS). Chemical constituents of the samples were identified and quantitatively analyzed by studying the GC/MS data. Recognition of chemical components of each essential oil sample was performed by the study of gas chromatograms, calculation of Kovats indices (KI) and inspection of mass fragmentation pattern obtained for each component. All the data instrumental data were compared with those reported in Wiley n17 library, the Nist and Pherobase databases and the relevant articles. The oil samples were further screened for their possible DPPH free radical scavenging effects by means of a DPPH /thin layer chromatographic method which showed a positive indication of anti DPPH activity through the visualization of spots and a yellow colour change on spraying the chromatoplates with a 0.2 % solution of DPPH in methanol. In case of *Haplophyllum glaberrimum* Bunge the yield of essential oil was found to be 0.5%. The oil additionally showed a significant Ferric Reducing Antioxidant Power (FRAP) which monitor the antioxidant efficacy of its constituents. Furthermore of 89 compounds identified in the essential oil of aerial parts of *Haplophyllum glaberrimum* Bunge, hexadecanoic acid was recognized as the major constituent (13.15%). Based on the results obtained in the present study the volatile components of *H. glaberrimum* may be considered as a suitable candidate for further studies as a free radical scavenging product.

**Keywords:** Analysis, Essential oil chemical composition, *Haplophyllum glaberrimum* Bunge

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## Induction of Adventitious Roots from *Papaver bracteatum* Lindl. Shoot Explants

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*Papaver bracteatum* Lindl. (Iranian poppy) is a medicinal plant including thebaine alkaloids [1]. Adventitious root cultures of medicinal plants are considered as a source of secondary metabolites for pharmaceutical industries. adventitious root were initiated on shoot explants of *P. bracteatum* in Murashige and Skoog media supplemented with 5 mg/ L-naphthalenic-acetic acid (NAA) and 5 mg/ L-1 indole-3-butyric acid (IBA). Compared with other hormones, IBA was the suitable auxin for adventitious root induction. Every shoot explant generates 10–15 adventitious roots (1- to 2-cm long) after 30 days. Here, we report efficient conditions for induction of adventitious roots in Iranian poppy.

**Keywords:** *Papaver bracteatum*, Adventitious root, Auxins

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## Assessment of Heavy Metals Phytotoxicity on Seed Germination of *Silybum marianum*

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Due to some natural events (e.g. volcanic activity and erosion) and some human activities such as industrials (e.g. mining, smelting and burning fossil fuels) and agricultural activities (e.g. using wastewater, applying fertilizer or pesticides and burning the crop residues), heavy metals (HMs) are released into the environment. Milk thistle (*Silybum marianum*) has been used therapeutically over 2,000 years, and most commonly for the treatment of liver and gallbladder disorders (1). Therefore, this study was conducted to determine the ability of *S. marianum* seeds to germination and early seedling growth in the presence of Cd, Ni, Cr, and Cu. The experiment was conducted as a completely randomized design with factorial arrangement and eight replicates at the College of Agriculture, Ferdowsi University of Mashhad, Iran, in 2015. The surface sterilized seeds of *S. marianum* were treated with 0, 20, 40, 60, 80, 100, 200, and 400 ppm of Cd, Ni, Cr and Cu. The results revealed that final germination percentage of *S. marianum* was not affected by heavy metals. The germination rate was affected in all treatments. The time needed for the first seed to germinate ( $T_0$ ) was not affected by all treatments whereas; the time needed for the 50 percent seed germination ( $T_{50}$ ) was affected by all treatments. Growth parameters of early seedling were influenced by all heavy metals. The effect of heavy metals on final germination percentage and seedling parameters at high concentrations was more prominent at higher concentrations.

**Keywords:** Heavy metals, Phytotoxicity, Seed germination, Seedling growth

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## Evaluation of Antitussive Activity of Hydro Alcoholic Extract of *Ocimum basilicum* Seeds in Mice.

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*Ocimum basilicum* also called great basil or Saint-Joseph's-wort, is a plant from Lamiaceae family. Leaves, stems and seeds of this plant have some pharmacological, antioxidant, antimicrobial activity and etc. Extract of 108g of powdered *Ocimum basilicum* Seeds were prepared at room temperature with ethanol 80% according to maceration method under 4 h shaking. The extract was kept in refrigerator until the experimentation. Antitussive Effect of the extract was measured by murine method of ammonia induced cough. At this experiment, mice were divided into 3 groups. Group one to three were received normal saline, extract (800 mg/kg-orally) and Dextromethorphan (25 mg/kg-orally) as positive control respectively. At first, mice received extract and Dextromethorphan. After 20 min, mice were put in a glass jar for 45s and the numbers of coughs were counted in 6 min out of jar. The obtained data was analyzed by SPSS software (version 16, USA). in this study, the Antitussive effect of the hydro alcoholic extract of *Ocimum basilicum* were examined according to the method described. The extract was reduced the number of cough. Base on the mean of cough in mice it was concluded that the extract has a good antitussive activity even better than dextromethorphan.

**Keywords:** *Ocimum basilicum*, Antitussive, Cough, Murine test



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**Study on the Analgesic and Anti-Inflammatory Effect of *Ailanthus Altissima* Extract in Mice.**

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*Ailanthus altissima* (tree of heaven, ailanthus) is a species of tree in the family Simaroubaceae. This tree is found in temperate climates rather than the tropics. The extract of this plant has many properties such as antibacterial, antiviral, antioxidant, cytotoxic, antidiarrheal, anti-inflammatory, antipyretic, analgesic, antihistaminic, antiparasitic, insect repellent, antiprogesterone. The hydroalcoholic extract of *A. altissima* stem bark of Iranian origin were evaluated for its analgesic and anti-inflammatory activities. Analgesic and anti-inflammatory activities were evaluated by using formalin test at doses of 50 mg/kg and 100 mg/kg of the extracts in male mice. Extracts showed a significant decrease on pain and Diameter of tissue Inflammation due to formalin injection under the skin of the dorsal surface of the mice hindpaw. The extract of *Ailanthus altissima* is able to reduce the tissue inflammation and the chronic pain caused by it. These effects can be due to the presence of anti-inflammatory compounds such as luteolin-7-O-glucoside (L7G) in this extract.

**Keywords:** *Ailanthus altissima*, Anti-inflammatory, Analgesic, Formalin test

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**Development of a Fingerprint Technique for Standardization and Quality Control of *Citrus aurantium* Flower Hydrosol.**

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Quality control and standardization of herbal and traditional products are two major challenges in their secure consumption and production process. The flowers of bitter orange with the scientific name *Citrus aurantium* L. is one of the most frequently used herbal product in Iranian traditional market for its therapeutic uses in addition to food and drink purposes, as prescribed by traditional healers. Pharmacological studies on the plant has proved several health effects such as anti-anxiety and insomnia, improvement of epilepsy and antioxidant. In this study 10 hydrosol samples of *Citrus aurantium* flowers produced by traditional and industrial process as well as a hydrosol sample prepared from fresh flowers of bitter orange were collected. The volatile chemical constituents of all samples were isolated by two different methods, liquid-liquid extraction and sonication as a shorter extraction process. The n-hexane extracts were then concentrated on a rotary evaporator and analysed by GC/MS. HPTLC chromatogram patterns of three samples showed the equal number of spots remarkably similar to those of standard sample. Identification of chemical components of hydrosol samples were performed by GC/MS technique. According to the results of GC/MS by drawing dendrogram cluster and comparisons between various samples and the standard were made. Using hierarchical cluster analysis (HCA) between the GC/MS and IR data precisely declared the differences in amounts and types of chemical components of various *C. aurantium* hydrosol samples and the standard. Based on the results of this study, the developed GC/MS, IR and HPTLC techniques can be effectively used in the quality control of *Citrus aurantium* flower hydrosol samples in the market. The method may be practically used for monitoring the quality of various herbal hydrosols.

**Keywords:** *Citrus aurantium* Flower, Hydrosols, Standardization

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## Phytochemical Analysis of the Methanolic Extract of Flowers of *Viola Cornuta* Linn.

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Flowers are the beautiful signs of God's creation and the best gifts for human due to their mental and nutritional value. Medicinal plants have a particular value in the provision of community health and many drugs have emerged with plant origin in different parts of the world in recent years. Violet (*Viola cornuta*) is a plant of the Violaceae family flowering at the end of winter and early in spring. Flowers, leaves, roots, seeds and even whole parts of this flower are used for medicinal purposes. The flowers of *Viola cornuta* Linn. were collected and methanolic extract prepared by microwave assisted extraction (MAE) method. The present study reveals that the phytochemicals analysis of eight different chemical compounds alkaloids (Wagner's Test), flavonoids (Alkaline Reagent Test), phenols (Ferric Chloride Test), tannins (Ferric Chloride Test), tri-terpenoids (Salkowski's Test), Steroids (Liebermann Burchard test), saponins (Foam Test) and proteins (Biuret's Test) were tested in methanolic extract. Then total flavonoids and total phenolic content of methanolic extracts were determined by the Aluminium Chloride Colorimetric and Folin-Ciocalteu method, respectively. Also, *in vitro* antioxidant activity of methanolic extracts were assayed by 1,1-diphenyl-2-picrylhydrazyl (DPPH<sup>0</sup>) free radical scavenging method. Whereas, *In vitro* antibacterial activity of the methanolic extract of flowers of *Viola cornuta* Linn. against *Staphylococcus aureus* (PTCC 1113) and *Escherichia coli* (PTCC 1399) determined by the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) assay. Our data showed total phenolic content of methanolic extract of flowers of *Viola cornuta* Linn. was 42.56±0.02 mg GAE/g dry plant material. Also, total flavonoid content of methanolic extracts was 23.14±0.1 mg QE/g dry plant material. The value IC<sub>50</sub> of methanolic extract determined 7.84 mg/ml. The results of the phytochemical screening of a methanolic extract of flowers of *Viola cornuta* Linn. showed that alkaloids, flavonoids, phenols, tannins, tri-terpenoids, steroids, saponins and proteins were present. Also, the methanolic extract of flowers of *Viola cornuta* Linn. showed significant antibacterial activity against both Gram positive and Gram negative bacteria. However, more investigations must be carried out to evaluate the mechanism of action of medicinal plants with different activities. In future the work on isolation of the compounds and establish a pharmacological agent for the treatment of different diseases is useful from the natural sources.

**Keywords:** *Viola cornuta* Linn., MAE, Alkaloids, MIC, Phytochemicals analysis

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## Mycorrhiza Effect on Essential Oil Components in *Nepeta Pogonosperma* Jamzad.

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*Nepeta pogonosperma* was identified as a new species in 1984 that its essential oil have Anti-inflammatory effect. in order to investigation the effect of mycorrhiza on *Nepeta pogonosperma*, this experiment was conducted at Alborz research station, Research Institute of Forests and Rangelands, Karaj, Iran. The experiment was conducted in a randomized complete blocks design with three replications. Treatments consisted of four levels of mycorrhiza that were non-use of mycorrhiza, inoculated with *Glomus intraradices*, inoculated with *Glomus mosseae* and inoculated with *Glomus intraradices*+*Glomus mosseae*. Essential oil was extracted by distillation for 2 hours and 30 minutes. The percentage of essential oil components was determined using GC and GC/MS. In the *Nepeta pogonosperma* Jamzad essential oil, 16 components were identified including  $\alpha$ -thujene,  $\alpha$ -pinene, sabinene,  $\beta$ -pinene, myrcene,  $\alpha$ -terpinene,  $p$ -cymene,  $e$ - $\beta$ -ocimene,  $\gamma$ -terpinene, terpinen-4-ol,  $\alpha$ -terpineol, 4 $\alpha$ , 7 $\alpha$ , 7 $\alpha$ -nepetalactone, 4 $\alpha$ , 7 $\alpha$ , 7 $\beta$ -nepetalactone, E-caryophyllene and  $\beta$ -bisabolene. Analysis of variance showed that The effect of inoculation with mycorrhiza was significant on essential oil content of *Nepeta pogonosperma*. The highest content of 1.8-cineole (10.3%) belonged to inoculated with *Glomus intraradices* and The highest content of Nepetalactone 1 (16.02%) belonged to inoculated with *Glomus mosseae*. In field conditions, 1,8-cineol and Nepetalactone 1 were more than the other compounds.

**Keywords:** Essential oil, Symbiosis, *Nepeta pogonosperma*, Medicinal plant, Iran



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## Assessment of Chemical Components and Biological Activities of Three Acid Treated Herbal Extracts by GC/MS and HPTLC

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Generally the Extracts and essential oils obtained from different parts of medicinal herbs after preparation may undergo specific types of processing before entering formulation stage. This may cause certain changes in their chemical contents of the extracts and therefore lead to a better pharmacological performance. This process usually known as treatment and called “tadbir” in Persian folk medicine. One of the common tadbir process in traditional medicine is the treatment with vinegar and acetic acid. This treatment has been used efficiently in the history of traditional pharmacy for the preparation of certain drug products for the treatment of particular diseases. The aim of treatment may include reduction of toxicity, removal of tartness, elimination of wastes or the transformation of chemical components and as a result adding new properties to the primary nature of herbal drugs. Seeds of three medicinal plant species including *Nigella sativa*, *Carum copticum* and *Carum carvi* were investigated in the present study. The possible variations in the chemical profile of volatile (essential oil) and the non volatile compounds (methanol extract) of each plant sample were studied under the treatment conditions with vinegar and acetic acid. Therefore the chemical components of each essential oil sample were characterised by gas chromatography/mass spectrometry(GC/MS) prior to and after treatment with vinegar and acetic acid and the results were compared. For the methanol extracts, total phenolic and flavonoid contents were determined treated and non treated extracts using standard procedures. A study of the antioxidant effects of the treated methanol extracts were conducted in order to justify the effect of treatment on the manifestation of antioxidant activity. In order to assess changes in the chemical profiles of methanol and dichloromethane extracts of the above three plant seeds due to the treatment, their TLC and HPTLC finger prints were prepared and studied in the present work.

**Keywords:** *Carum carvi*, Treatment, *Nigella sativa*

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## Bioinformatics Study of Gene Encoding Menthol Dehydrogenase as Final Steps of Menthol Biosynthesis

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(-)-Menthol is the most applicable of the monoterpenes of essential oil from peppermint (*Mentha x piperita*). The last step of the Menthol biosynthesis pathway is the reduction of the C3-carbonyl of (-)-(1R, 4S)-menthone to (-)-(1R, 3R, 4S)-menthol by (-)-menthone:(-)-(3R)-menthol reductase. Every Metabolic engineering program needs bioinformatics studies consist of gene blasting, protein blasting, multiple alignment, secondary and 3 dimensional structure and phylogenetic study. The one of the more effective candidate genes to increasing of menthol production by manipulation is Menthol dehydrogenase. The gene with AY288138.1 accession number was selected to bioinformatics analysis. blastn analysis revealed high identity between AY288138.1 and JQ669252 (100%), KU174202 (96%), JN587749 (89%), KY531252 (83%), and EF426466 (72%). Also Short-chain dehydrogenases/reductases (SDR) superfamily was identified by conserved domain identifier. Also Multiple Alignment (ClustalX 2.1) between 6 selected mRNAs coding menthol dehydrogenase showed that the gene encoding of this enzyme is highly conserved. Secondary structure prediction was done by PSIPRED. Results showed that the secondary structure of menthol dehydrogenase is formed by helix and random Coil. Also for better understanding of features of menthol dehydrogenase tree dimensional structure predicted by <https://rscb.org/pdp>. In other hands the phylogenetic analysis based on mRNA sequences revealed that the minimum and maximum genetic distance was between (AY288138.1, KU174202.1) and (AY288138.1, JQ669252) respectively.

**Keyword:** *Mentha* sp., Menthol dehydrogenase, Metabolic engineering

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## Assessment Capsid Structure from Plants for Virus-like Nanoparticles in Cellular Delivery.

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Understanding capsid assembly following recombinant expression of viral structural proteins is critical to the design and modification of virus-like nanoparticles for biomedical and nanotechnology applications. Virus-like nanoparticles (VNPs) are emerging as versatile tools in nanotechnology as a consequence of the highly evolved control over their composition and morphology. Based on the protein shell of viruses, these supramolecular self-assembled nanoparticles comprise either infection-derived virions or recombinant virus-like particles lacking the infectious genome. In many cases, the capsid structure is known to nearatomic resolution, permitting precise rational modification of their structures by genetic and/or chemical means. Proof-of-concept studies aimed at turning virus capsids into drug delivery vehicles and molecular imaging reagents demonstrate their amenability to, and the potential of, chemical conjugation to VNPs. Among expression systems for the production of recombinant VNPs, transient expression in plants has emerged as an efficient and flexible platform permitting facile coexpression of multiple capsid proteins, the rapid assessment of capsid protein modifications, and high fidelity assembly of the capsid particles. Here, we use plant-based transient expression of the Bluetongue virus (BTV) structural proteins, to obtain high yields of empty and green fluorescent protein (GFP)-encapsidating core-like particles (CLPs) from leaves. The VNP presented here, derived from the BTV CLP, is easily produced in plants, from where it can be isolated with a single purification step. We show that the BTV CLP is able to carry cargos of encapsidated protein or bioconjugated small molecules. Their potential to deliver diverse cargos to target cells was demonstrated by exploiting their natural affinity to human integrins and by using encapsidated entities to report binding to these medically relevant proteins and interaction with cells that overexpress them. Here, we used methods Gel Electrophoresis, Transient Expression and Purification, Solid-State Binding Assay, Size-Exclusion Chromatography, UV/Vis Spectrophotometry, Confocal Microscopy with MCF-7 cells, Dynamic light scattering (DLS), Electron Microscopy (TEM).

**Keywords:** Virus-like nanoparticle, Bluetongue virus (BTV), Green fluorescent protein (GFP).

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## Green Synthesis of Ag Nanoparticles Using *Lavandula stoechas* Plant Extract and Evaluation of their Antioxidant Properties and Its Toxicity on RAW264 Grade Macrophage Cell.

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Nanostructured materials have attracted a lot of attention in the last few decades due to their unique physical and chemical properties. Nanoparticles with a size of 1 to 100 nm exhibit new properties. Due to the antibacterial effects of Ag nanoparticles, they are used in various applications. The findings of the last decade have shown that electromagnetic, optical and catalytic properties of nanostructured metals are affected by their shape and size. This has been motivated to advance production methods that can well control their shape and size. On a nanoscale, particles have very high cross sections And a large number of atoms interact quickly with the environment and bacteria. In recent years, bio-synthesis of nanoparticles using a medicinal plant extract as a simple and durable substitute for chemical and physical synthesis of metal nanoparticles has been widely considered. The purpose of this study was to prepare silver nanoparticles by bio-synthesis (green synthesis) using hydroalcoholic extract of lavender plant and Examination of its toxicity and antioxidant properties. In this study, hydroalcoholic extraction was performed by percolation method. Then, for the synthesis of nanoparticles, the green method was used and for characterize the synthesized nanoparticles. XRD, FT-IR and DLS analysis, as well as electron microscopy were used. The effect of toxicity on cells was also assessed using MTT, and antioxidant activity of synthesized nanoparticles was assessed by performing DPPH. The results indicated that the XRD pattern of the Ag nanoparticles is consistent with the Reference pattern of Metallic Ag nanoparticles. Also, the amount of synthetic Ag nanoparticles has increased with *Lavandula stoechas* Plant Extract. The synthesized nanoparticles are spherical and have a size of about 20 to 50 nanometers And the surface charge of the nanoparticles was negative and most of the nanoparticles had a load of 1/25 mV. The results indicate that some of the factor groups in the plant extract are present on the surface of the Ag nanoparticle. The cell viability was reduced by increasing the concentration of Ag nanoparticles and the amount of antioxidant activity of the Ag nanoparticles containing the nanoparticles increased significantly at a higher concentration of nanoparticles. In general, the findings of this study showed that the green synthesis of Ag nanoparticles could replace its chemical synthesis. It also increased its antioxidant and antibacterial properties with the help of Medicinal Plants extracts.

**Keywords:** Ag nanoparticles, Green synthesis, Hydroalcoholic extracts, *Lavandula stoechas*

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## Phytochemical Composition of Two Barberry Species from East Azerbaijan Province

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Barberry is one of the medicinal plants that have various biological properties such as anti-proliferative, anti-migratory, anti-bacterial and antioxidant activities. This crop is very important for human nutrition and health due to many bioactive compounds such as antibiotics, alkaloids and antioxidants. The purpose of the present study was to evaluate the antioxidant capacity (AC), total anthocyanin (TA) and total phenol content (TPC) of six genotypes of two barberry species in East Azerbaijan-Iran. Barberry fruits were harvested from six genotypes (four genotypes from *B. vulgaris* and two genotypes from *B. integerima*) at the fully maturates stage (in October and November 2016) and were frozen with liquid nitrogen and kept at  $-80^{\circ}\text{C}$  until phytochemical factors analysis. ANOVA results revealed that AC, TA and TC contents among barberry genotypes were statistically different ( $p < 0.05$ ). The TPC of barberry genotypes varied within 28.93–65.33 mg GAE per 100 g FW basis. According to the results, the highest and lowest TA content was observed in G5 (Tabriz) and G2 (Jerjen) genotypes (23.69 and 0.19 mg.  $100\text{g}^{-1}$  FW, respectively). In the case of antioxidant activity, the highest level (39.12%) and lowest level (15.37%) antioxidant activity were observed in G6 (Maragheh) and G3 (Duzal) genotypes, respectively. The present study also showed that barberry fruits have the most promising antioxidant agent compare to the synthetic antioxidants such as BHA. Thus, results of the present study supported the antioxidant and nutraceutical potential of this plant species and various phytochemical characteristics of barberry species.

**Keywords:** Antioxidant capacity, Barberry, Total phenol, Phytochemical variation, Genotypes

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## The Essential Oil Composition and Phytochemical Content of *Rosa foetida* Grown in Kurdistan.

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Iran is one of the most important rose germplasm centers with unique genetic diversity. *Rosa foetida* common name is Persian yellow rose and is widely distributed in mountains of Kurdistan, North-West of Iran. The decoction of the petals has been used in Iranian traditional medicine as anti-diarrhea and for treatment of stomach disorders. It is used traditionally in some foods as yellow color agent. To the best of our knowledge, this is the first study of the composition of essential oil and phytochemical contents of the *R. foetida* collected in Kurdistan region. The essential oil content was obtained at 0.1 % from the petals of *R. foetida* distilled immediately after the harvest. GC-Mass spectrometry analysis resulted in the identification of six components, representing 73% of the total oil composition. The major components of the essential oil were Eicosane (50.27 %), Hexatriacontane (10.98 %) and 9-Nonadecene (2.55 %). Spectrophotometer used for determination of phytochemical content. The amount of total flavonoid, antioxidant activity by DPPH and FRAP, and total phenol were measured as 0.619 mg/g and 31.66% and 13.85 mg/g, and 32.75 mg/g respectively.

**Keywords:** *Rosa foetida*, Flowers, Essential oil, GC-Mass

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## Optimization of Hairy Root Induction in Medicinal Plant *Echinacea purpurea*.

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*Echinacea purpurea* (Asteraceae) is an important perennial medicinal plant. The main bioactive compounds responsible for the pharmacological actions are caffeic acid derivatives (CADs) such as caftaric acid, chlorogenic acid, caffeic acid, and cichoric acid. Commercial production of *E. purpurea* has been limited by a range of issues including contamination of plant materials by microorganisms, pollution from the environment, variability of active components and lack of pure, standardized plant material for biochemical analysis. Hairy root cultures a promising alternative to whole plant extraction for the production of valuable plant secondary metabolites. The advantages of using hairy roots are their independence of plant growth regulators, high growth rates, and genetic and biosynthetic stability. In this study, an efficient transformation system for the medicinal plant *E. purpurea* was successfully developed and optimized using *Agrobacterium rhizogenes*. Four bacterial strains, ATCC15834, A13, A4, and A7 and five explant types, leaf blade, petiole, cotyledon, hypocotyl and root, were examined. Two inoculation methods (immersion and injection) and two inoculation times were also considered. Among different strains, A13 was the most promising candidate for hairy root stimulation because it induced the highest growth rate, root number, and transformation efficiency. The highest frequency of transformation was achieved in hypocotyl explants excised from 45-day-old seedlings. Maximum number of hairy roots (20 rhizocloned per explant) were obtained by immersion method at 30 min of inoculation. Transgenic hairy root lines were confirmed by polymerase chain reaction (PCR). The results of this study provide the basis for an experimental platform for the study of the biosynthesis and molecular regulation of secondary metabolites in hairy roots cultures of *E. purpurea*.

**Keywords:** *Echinacea purpurea*, Secondary metabolites, *Agrobacterium rhizogenes*

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## *In Vitro* Anti-Proliferative and Apoptotic Activity of *Astragalus Ovinus* Leaf Extracts and Its Terpenoid Fraction on HT-29 Human Cancer Cell Line.

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*Astragalus ovinus* (Fabacea) has been used in folk medicine to treat a different of diseases. Despite some reports about the antitumor effects of some species of this genus, there is no evidence addressing this effect in *Astragalus ovinus*(*A. ovinus*). Here, we studied the cytotoxic effect of methanolic extract of *A. ovinus* and its terpenoid fraction on HT-29 colorectal cell line. HT-29 cells were cultured and then incubated in the methanolic extract of *A. ovinus* and its fractions with various concentrations for 24 hours. Cell viability was measured by MTT assay. Furthermore, effects of the indicated extracts were tested on some regulators of cell death such as Caspase-8, Caspase-9. The estimated IC<sub>50</sub> values of the methanolic extract, and terpenoid fraction on HT29 cell after 24 h were determined 832.88 and 346.92 µg/ml, respectively. *A. ovinus* extract and its fraction induced apoptosis by activation of caspase-8 and caspase-9. Our data confirmed the significant cytotoxic and antiproliferative effects of *A. ovinus* on colorectal cell line through induction caspase. These findings provide a basis for the therapeutic potential of *A. ovinus* in the management of colon cancer. Isolation of the compound responsible for this effect may lead to the development of a new anticancer compound against colorectal cancer.

**Keyword:** *Astragalus ovinus*, HT29, Apoptosis, Caspase, Antiproliferative

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## Phenolic Compounds and Antioxidant Activity in 15 Collected Small Fruits from Urmia.

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Wild grown small fruits are widespread in Khan-Darasi of Urmia and have been extensively used in herbal medicine. This study was accomplished in order to examine the total phenolic content and antioxidant activity of different small fruits in 15 species. Total phenolic content, total flavonoid content, total carotenoid and antioxidant activity were determined using Folin-Ciocalteu assays, aluminum chloride method, Lichtentaler method, DPPH assay respectively. Total phenolic content was in its highest value (5.096 mg GAE/g FW) in the *Rubus ulmifolius* sub sp. *sanctus*, whereas the lowest level (0.315 mg GAE/g FW) was found in the *Physalis alkekengi*. Total flavonoid content was in its highest value (14.433 mg /100g FW) in the *Rubus ulmifolius* sub sp. *sanctus*, whereas the lowest level (0.8 mg /100g FW) was found in the *Physalis alkekengi*. The highest level of total carotenoid content (20.508 µg/g FW) was found in *sambucus nigra marginata*. The highest level of antioxidant capacity in DPPH assays were found in *Rubus ulmifolius* sub sp. *sanctus* (86.634 %). These results showed that different small fruits especially *Rubus* promising sources of natural antioxidants and other bioactive compounds beneficial without any harmful effects to be used in the food or the pharmaceutical industries.

**Key words:** Small fruits, Phenol, Flavonoid, Antioxidant activity, Phytochemical

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## Genetic Diversity in Barberry Genotypes from Northwest of Iran as Revealed by Biochemical Characteristics and ISSR Markers.

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In the present study Genetic Diversity in Barberry Genotypes from Northwest of Iran as Revealed by biochemical characteristics and Inter-simple sequence repeat (ISSR) markers. Molecular diversity by ISSR markers was investigated in 26 individuals of Barberry genotypes from Northwest of Iran. Also, pH, total soluble solids (TSS), total acidity (TA) and total carotenoid (TCC) of genotypes were determined. This study showed that various species of barberry fruits have different amounts of TSS, pH, TA and TCC. The pH of barberry genotypes varied within 2.71 for G1 (*B.carataegina*) to 3.70 for G3 (*B.vulgaris*). According to the results, the highest and lowest TSS content was observed in G9 (*B.vulgaris*) and G17 (*B.integerima*) genotypes (18.50 and 2.00) respectively. In the Total acidity, the highest (13.90) and lowest (3.90) total acidity were observed in G1 (*B.carataegina*) and G11 (*B.integerima*) genotypes, respectively. Also the highest and lowest TCC content was observed in G2 (38.37 mg/g FW) from (*B.vulgaris*) genus and G17 (4.44 mg/g FW) from (*B.integerima*) genus respectively. Inter-simple sequence repeat (ISSR) techniques produced 58 polymorphic bands. Result showed that the genetic similarity between barberry genotypes was 0.47 to 1.00 and the populations were divided into four groups.

**Keywords:** Barberry, Genetic Diversity, ISSR Markers, Biochemical

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## Phenolics Content and Cytotoxic Activity of *Zataria multiflora* Boiss. Plants Against Breast Cancer Cell Line (MCF-7) Through Manipulation of Culture Medium by Biotic Elicitors.

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*Zataria multiflora* Boiss. (Lamiaceae) is well known as a plant with enriched matrix of phenolics which provide the plant with potent antioxidant and anti-inflammatory activities. The aim of the present study was to evaluate the biochemical and cytotoxicity of *Z. multiflora* extract under manipulation of culture media. In this study, stimulatory effects of chitosan and yeast extract on phenolic content and cytotoxic activity of *Z. multiflora* against human breast cancer (MCF-7) cell line were evaluated. The seeds were cultured on solidified Murashig and Skoog (MS) medium and the emerged seedlings were grown for 60 days. Then chitosan (20 mg L<sup>-1</sup>) yeast extract (800 mgL<sup>-1</sup>) were added separately to the media and the plants were harvested after 14 days. Aerial parts of the plants were extracted with methanol and phenolics compound there were detected by high performance liquid chromatography (HPLC). Cytotoxic activity of the extracts was evaluated by MTT assay. Rosmarinic acid, carvacrol, trans-ferulic acid, hesperetin, and catechin, in tandem, were detected as major phenolic compounds of the control plants. Despite a reduction of 20-25% of carvacrol and rosmarinic acid in chitosan-treated plants, new phenolics i.e., quercetine, thymol, and chlorogenic acid were induced. Similar results were obtained by treatment of the plants with yeast extract except for the induction of caffeic acid instead of chlorogenic acid. The viability of MCF-7 cells were respectively reduced to 30, 19, and 17 percent after treatment with the extract of control plants and chitosan, and yeast-extract treated ones. The results provide more evidences for anticancer properties of *Z. multiflora* and implies that this potential can be efficiently improved by biotic elicitors.

**Keywords:** Chitosan, MCF- 7 breast cancer cell line, Phenolic compound, *Zataria multiflora*,

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## Antioxidant Activity, Total Flavonoid and Phenolic Content of Some *Nepeta* Species.

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The genus *Nepeta* L. belongs to the Labiatae family. Iran is one of the biodiversity centers of *Nepeta*. Due to its positive effects on the anti-inflammatory, antispasmodic, antimicrobial and antiviral, *Nepeta* has recently become quite a popular herbal medicine in phytotherapy. This study was undertaken in order to examine the total phenolic content, total flavonoid content and antioxidant activity of *Nepeta* in 7 accessions (Includes four species). Antioxidant capacity, total flavonoid content and total phenolic content were determined using FRAP and DPPH assays, aluminum chloride and Folin-Ciocalteu reagents respectively. Total phenolic content was in its highest value in *N. cataria* (87.40 mg GAE/g DW), whereas the lowest level was found in *N. saccharata* (24.59 mg GAE/g DW). Total flavonoid content was in its highest value (3.77 mg que /g DW) in the *N. fissa*, whereas the lowest level (0.8 mg que /g DW) was found in the *N. racemosa*. The amount of antioxidant activity by DPPH and FRAP were measured as 77.26% (*N. cataria*) and 2.23 μmol Fe<sup>2+</sup>/g DW (*N. cataria*) respectively. These results showed that different species of *Nepeta* especially *N. cataria* are promising sources of natural antioxidants and other bioactive compounds beneficial to be used in the food or the pharmaceutical industries.

**Keywords:** Labiatae, FRAP, DPPH, Flavonoid.

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## Effect of Various Growing Areas on Phytochemical Properties and Antioxidant Activity of Gooseberry.

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Gooseberry (*Physalis*) is one of the most important medicinal plants that widely used for dealing with hepatitis, malaria, rheumatism, cancer, dermatitis and asthma in most of developed countries. The purpose of this study was to determine, the impact of 10 different climatic conditions in North-West of Iran (includes Bonab, Maragheh, Khoy, Urmia, Silvana, Boukan, Tekab, Greenhouse culture, Wild grown) on the *Physalis* fruit from the standpoints of the phytochemical content and antioxidant activity. Fruits were harvested after ripening and were transferred to laboratory for measurement of phytochemical properties. The results showed that climatic factors had significant effects on total phenol, total flavonoid, total carotenoid,  $\beta$ -carotene and antioxidant activity of fruits. The amount of total phenol, antioxidant activity by DPPH, total flavonoid, total carotene and  $\beta$ -carotene were measured as 8.80-34.11 mg GAE/g FW, 11.36-44.13%, 2.09-7.06 mg Que/g FW, 79-614  $\mu$ g/g FW and 0.04-0.46  $\mu$ g/g FW respectively. Results showed that Greenhouse culture can be considered for *Physalis* cultivation for high phytochemical content and antioxidant activity.

**Keywords:** *Physalis*, Climate, Medicinal plant, Phytochemical

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## Effects of Supplemental Genistein on Performance and Gut Microflora in *Escherichia Coli*-Challenged Broiler Chickens.

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The present study was conducted to investigate the effect of dietary supplementation of genistein on growth performance and intestinal bacterial populations in *Escherichia coli*-challenged broiler chickens. A total of 450 day-old Ross broiler chicks were randomly distributed between 3 dietary treatments. On day 10 of age, half of replicates in each dietary treatment group were randomly challenged with a mix of K1 and O78 serotypes of *Escherichia coli*. Results showed that although feed intake wasn't affected by experimental treatments, *Escherichia coli*-challenged birds had the lower body weights at days 21 ( $P < 0.01$ ) and 42 ( $P < 0.05$ ) of age. Moreover, subjecting to *Escherichia coli* impaired ( $P < 0.01$ ) feed conversion ratio (FCR) throughout the experimental period. On the other hand, dietary inclusion of genistein increased ( $P < 0.05$ ) weight gains at 21 and 42 days of age. In addition, FCR values were improved as a result of dietary genistein supplementation, and this effect was more obvious in *Escherichia coli*-challenged chickens (genistein  $\times$  *Escherichia coli*,  $P < 0.01$ ). Supplemental genistein reduced ( $P < 0.01$ ) ileal and cecal enumerations of *Escherichia coli* and *Salmonella*. The present results suggest that dietary supplementation of genistein isoflavonoid can reduce detrimental impacts of pathogenic bacteria within the intestinal tract. Furthermore, growth rate and feed conversion efficiency can be improved as the result of supplemental genistein in broiler chickens.

**Keywords:** Broiler chicks, Isoflavonoids, *Escherichia coli* challenge, Pathogenic bacteria

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## Silymarin Improved Performance and Immune Responses in Aflatoxin-Challenged Broiler Chicks.

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The present study was conducted to investigate the effects of dietary supplementation of silymarin on performance, differential leukocyte count and immune responses in broiler chickens subjected to a mix of aflatoxins. A total of 330 one-week-old Ross broiler chicks were randomly distributed between 7 experimental groups with 4 replicates of 12 birds each. Experimental treatments consisted of a control group (unchallenged), and a 2 × 3 factorial arrangement, including 2 aflatoxin levels (0.5 and 2 ppm) and 3 levels of supplemental silymarin (0, 500 and 1000 ppm). Birds were challenged with a mix of aflatoxins from 7 to 28 days of age. Increase in dietary aflatoxin level caused decreases ( $P < 0.01$ ) in feed intake (ADFI) and body weight gain, consequently it impaired ( $P < 0.001$ ) feed conversion ratio throughout the trial period. Dietary supplementation of silymarin resulted in the marked increases ( $P < 0.01$ ) in both feed intake and weight gain, and improved feed conversion efficiency in aflatoxin-challenged chicks. Exposure to 2 ppm aflatoxins caused a significant ( $P < 0.001$ ) increase in neutrophil count and decreased ( $P < 0.001$ ) lymphocytes in 28 days-aged chickens. In addition, antibody responses against infectious bronchitis and Newcastle disease viruses were diminished ( $P < 0.05$ ) as the result of dietary contamination with 2 ppm aflatoxin as compared with 0.5 ppm aflatoxin. Antibody titer to infectious bursal disease virus was also lower ( $P < 0.001$ ) in 2 ppm aflatoxin-challenged birds. Inclusion of silymarin into the diet caused a linear increase ( $P < 0.001$ ) in lymphocyte count. Furthermore, dietary supplementation of 500 and 1000 ppm silymarin increased ( $P < 0.05$ ) antibody titers against Newcastle and infectious bronchitis disease viruses. The present findings indicate that silymarin has a good potential to alleviate the adverse effects of aflatoxin-contaminated diets.

**Keywords:** Broiler chickens, Silymarin, Aflatoxins, Growth performance, Humoral

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## Effect of *Aloe vera* L Powder and *Trachyspermum copticum* Essential Oil on the Shelf Life of *Oncorhynchus mykiss* Fillets in the Refrigerated Storage Temperature.

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This study was conducted to investigate the effects of *Aloe vera* L powder as well as *Trachyspermum copticum* essential oils on the shelf life of *Oncorhynchus mykiss* fillets during refrigerated storage. Fish fillets were treated in *Trachyspermum copticum* essential oil (0/1 and 0/4) and *Aloe vera* L powder (0/1 and 0/4) in order to achieve the best percentage of oils and powders and for each group 3 replicates were prepared. Chemical factors (pH, TVN, protein, Wet and Ash), microbial factors and sensory characteristics at days 0, 5, 10 and 15 were evaluated. In our study, significant difference were found in the pH of the treatments during increasing storage time ( $P > 0.05$ ). Changes of TVN in 0/1% essential oil of *Trachyspermum copticum* coated fillet were less than other treatments ( $P < 0.05$ ). In all treatments, fat values showed significant ( $P < 0.05$ ) differences on the 1<sup>th</sup>, 5<sup>th</sup> and 10<sup>th</sup> days of study. Sensory characteristics of treatments were not acceptable on the 15<sup>th</sup> day of the experiment. The results showed that live microbial communities, TBA, FFA, wet and ash were significantly affected by different levels of herbal plants ( $P < 0.05$ ). Based on these results, it seems that the powders obtained from *Aloe vera* L and *Trachyspermum copticum* essential oil decrease the oxidation process and increase the shelf life of rainbow trout and can be an appropriate natural alternative to artificial preservatives.

**Keyword:** *Oncorhynchus mykiss*, Essential oil, TBA, Protein.



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**The Effect of Different Level of *Trachyspermum ammi* Nutritional Supplements on Hematological, Biochemical and Immune Parameters of *Acanthopagrus Latus*.**

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Due to the increased bacterial resistance to common antibiotics, there is tendency towards using herbal extracts in order to increase the non-specific immune system. This study was conducted to evaluate the effects of different levels of *Trachyspermum ammi* Nutritional supplements on hematological, biochemical and immune parameters of *Acanthopagrus latus*. For this purpose, fish with mean ( $\pm$ SD) weight of 9 g were raised for 7 weeks in Vnro tanks (300 L water), 10 fish to each tank and feeding with different levels of *Trachyspermum ammi* powder with concentrations of % 0, % 1, % 2.0 and % 4.0, three replicates were used for each concentration. At the end of the trial, blood samples were collected to determine some hematological, biochemical and immunity parameters in different groups and compared to one another. Results showed significant differences in RBC and WBC count, neutrophil percentage, haemoglobin (Hb), haematocrit (HCT) value and total protein (TP) activity in fish fed T. ammi powder (especially with 2 and 4.0% concentrations) when compared with control group. The results suggest that T. ammi powder may enhance the non-specific immune system of A. latus. Thus, using this supplement especially at of 2.0% level as immunostimulants was recommended in A. latus diet.

**Keywords:** *Trachyspermum ammi*, *Acanthopagrus latus*, Haematocrit

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**Effects of Dietary Inclusion of *Origanum Vulgare L.* on Performance and Gut Microflora in Broiler Chicks.**

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The study presented here was carried out to investigate the effects of dietary supplementation of oregano (*Origanum vulgare L.*) extract on performance parameters and intestinal microflora in broiler chickens. A total of 300 one-day-old Ross 308 broiler chicks were randomly distributed among 5 replicates (12 birds in each) of the 5 dietary treatments. Experimental diets consisted of a control group (without any feed additive) and groups supplemented with 250, 500, 750 or 1000 mg/kg of oregano extract. Three randomly-selected birds from each replicate were slaughtered at the end of trial to investigate the ileal bacterial populations. Results showed that dietary supplementation with oregano extract increased ( $P < 0.05$ ) feed intake during the starter and grower periods. As a consequence, the greater ( $P < 0.01$ ) weight gains were observed in the birds supplemented with 500 and 750 mg/kg of oregano extract. Similarly, dietary inclusion of 500 to 1000 mg/kg of oregano extract improved feed conversion ratio during the grower ( $P < 0.01$ ) and finisher ( $P < 0.05$ ) periods. Dietary supplementation of oregano extract caused the linear ( $P < 0.05$ ) decreases in ileal enumerations of *Salmonella* and *Escherichia coli*. On the other hand, ileal *Lactobacillus* count was increased ( $P < 0.01$ ) as the result of dietary supplementation with 250 mg/kg of oregano extract. From the present findings, it can be concluded that dietary inclusion of oregano extract at the levels of 500 and 750 mg/kg can improved performance parameters and modulate intestinal microflora in broiler chickens.

**Keywords:** Broiler chicks, Oregano extract, Carvacrol, Intestinal bacterial populations

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## Effect of Dietary Supplementation of Eucalyptus Leaves on Growth Performance and Immunocompetence of Broiler Chickens.

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This study was conducted to investigate the effects of dietary inclusion of eucalyptus (*Eucalyptus globulus*) powder on growth performance and immune functions of broiler chickens. A total of 300 day-old Ross 308 broiler chicks were randomly assigned to the 4 dietary treatments with 5 replicates of 15 birds each. Dietary treatments consisted of different levels (0, 2, 4 and 6%) of eucalyptus leaf. In addition to performance parameters, the birds were immunized against different viral antigens (infectious bronchitis, Newcastle and avian influenza) to evaluate the effects of eucalyptus powder on antibody responses against these viral antigens. Results showed that dietary inclusion of 6% eucalyptus leaf decreased average daily feed intake during the starter ( $P < 0.01$ ) and grower ( $P < 0.05$ ) periods. As a result, body weight gains were significantly ( $P < 0.05$ ) lower in birds supplemented with 6% eucalyptus leaf throughout the experimental period. In addition, dietary supplementation of 4 and 6% eucalyptus leaf impaired ( $P < 0.05$ ) feed conversion ratio during the starter and grower periods. Dietary supplementation of eucalyptus at the levels of 2 and 4% increased ( $P < 0.01$ ) antibody titers against avian influenza and infectious bronchitis disease viruses. Moreover, the relative weights of spleen and thymus were greater in birds supplemented with 2% eucalyptus leaf. The present findings show that eucalyptus leaf can improve antibody responses against the respiratory viruses.

**Keywords:** Broiler chickens, *Eucalyptus globulus*, Antibody titer, Humoral immunity

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## Dietary Supplementation of Red Pepper Could Modulate Immune Responses Against Avian Influenza in a Chick Model.

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The present study was conducted to investigate the effect of dietary supplementation of red pepper on growth performance and immunocompetence in broiler chickens. A total of 390 day-old Ross broiler chicks were randomly distributed among 5 pen replicates of 6 dietary treatments. Experimental diets consisted of different levels (0, 0.2, 0.4, 0.6, 0.8 and 1%) of red pepper powder (*Capsicum frutescens*), that fed to the birds during a 42 days feeding trial. Antibody responses against different viral antigens were assessed after the related inoculations. Results showed that dietary inclusion of red pepper at the levels of 0.2 to 0.8% had no marked effect on feed intake. Average daily feed intake and body weight gain, however, were dramatically ( $P < 0.01$ ) decreased in birds supplemented with 1% red pepper powder. On the other hand, dietary inclusion of 0.2 and 0.4% red pepper improved ( $P < 0.05$ ) feed conversion ratio. Although antibody responses against infectious bronchitis and infectious bursal disease viruses weren't influenced by dietary inclusion of red pepper powder, antibody titers to avian influenza were greater ( $P < 0.01$ ) in birds supplemented with 0.6 and 0.8% red pepper. In addition, dietary supplementation of red pepper at the levels of 0.2 and 0.4% increased ( $P < 0.05$ ) Newcastle antibody titer. The present findings indicate that red pepper powder can be used in broiler diets to promote immune system against different viral diseases, especially avian influenza.

**Keywords:** Broiler chicks, Red pepper powder, Avian influenza, Immunological responses, Antibody titer

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## Effect of Drinking Administration of a Thymol-Eucalyptol Extract on Immunological Responses and Carcass Oxidative Stability in Broiler Chicks.

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The present trial was designed to investigate the effects of an extract mix of thymol-eucalyptol (TE) on immune functions and meat oxidative stability in broiler chickens. A total of 360 one-day-old Ross broiler chicks were randomly allotted to 6 pen replicates of 4 experimental treatments. The experimental treatments consisted of different levels (0, 200, 400 or 600 mL/1000 L of drinking water) of a mix of TE. Drinking administration of this extract was done during a 42 days trial. Results showed that TE extract increased the relative thymus weight at day 42 of age. On the other hand, administration of TE extract increased antibody titers against infectious bronchitis ( $P < 0.001$ ) and Newcastle ( $P < 0.05$ ) disease viruses. Antibody production titers to avian influenza and infectious bursal disease viruses weren't affected by drinking administration of TE extract. Utilization of TE extract in drinking water caused a linear ( $P < 0.01$ ) decrease in malondialdehyde (MDA) content of thigh meat. The MDA level of breast meat, however, wasn't influenced by TE extract. The present results show that drinking administration of TE extract at the levels of 200 to 400 mL/1000 L can improve immune functions in broiler chickens.

**Keywords:** Broiler chicks, Thymol and eucalyptol, Humoral immunity, Antibody titer, Carcass oxidative stability

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## The Response of Garlic (*Alium sativum* L.) Medicinal Plant on Different Irrigation Intervals.

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In medicinal plants cultivation as well as other crops water deficiency in arid/semiarid areas is a critical challenge, but by understanding the process of its impact, and by applying appropriate management, its negative effects can be minimized. The competition for existing freshwater supplies will require a paradigmatic shift from maximizing productivity per unit of land area to maximizing productivity per unit of water consumed [1]. In this regard, the use of drip irrigation in irrigation of medicinal plants and the determination of the most suitable irrigation interval is a suitable method. Drip irrigation involves dripping water onto the soil at very low rates from a system of small diameter plastic pipes fitted with outlets called emitters or drippers. Drip irrigation method in comparison with other methods provides a very favourable high moisture level in the soil in which plants can flourish. Garlic is an important medicinal herb that is readily available everywhere. Garlic does indeed have scientifically-proven medicinal properties. It contains a substance called Allicin, which has anti-bacterial properties that are equivalent to a weak penicillin. Generally, garlic appears to have anti-bacterial and anti-viral properties. Here, an experiment was carried out as a randomized complete block design with three irrigation intervals (6, 9 and 12 day's intervals) and three replications in 2016-17 growing season. Garlic plants were irrigated by drip irrigation method. The studied traits included fresh and dry weight of bulbs, yield, and water use efficiency (WUE). Results indicated that the effect of irrigation treatments on fresh and dry weight of bulbs, diameter of bulbs, yield, and WUE was significant. With increasing irrigation interval from 6 to 12 days, these traits were decreased. Meanwhile, using 9 days irrigation interval as well as 6 days treatment significantly improved garlic production and WUE in compared to treatment of 12 days irrigation interval. This was further supported by a higher leaf area index and crop growth rate of such treatment. So, 9 days irrigation interval increased WUE and was the optimal scheme for garlic production.

**Keywords:** Drip irrigation, Garlic, Irrigation interval, Water use efficiency, Yield

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## Allelopathic Effects of Peppermint (*Mentha piperita* L.) Remains and Water Extract on Field Bindweed (*Convolvulus arvensis*), Radish (*Raphanus sativus* L.) and Tomato (*Lycopersicon esculentum*).

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Allelochemicals release from aromatic plants, influence the growth and physiology of other plants [1]; therefore, the investigation of their effects on plants is very important. In the present study, the effects of peppermint's allelochemicals were studied on germination factors and vegetative growth of field bindweed (*Convolvulus arvensis*), radish (*Raphanus sativus* L.) and tomato (*Lycopersicon esculentum*). The experiment was conducted based on a completely randomized design (CRD) with three replications. For this purpose, different treatments of leaf powder (0, 25, 50, 75, and 100 g/Kg), and water extract (2, 4, 6, 8 and 10% of) 10% weight/volume (w/v) of *Mentha piperita* were prepared and added to pots, with distilled water as a control treatment. After 40 days, the plants were harvested, and growth indices were measured. All data were analyzed using SAS software (version 9.3), and the means were compared using LSD test at the 5% level. The results showed that all studied traits of the plants decreased, at different amounts of peppermint leaf powder ( $P \leq 0.05$ ). The allelopathic effects of the treatments were varied, depending on the proportion was used. For example, powder effective quantity for field bindweed was 50 mg/kg per pot. It could be stated that, the compounds in the leaf powder of peppermint, lead to high levels of reactive oxygen species. Subsequently oxidative stress inhibits the growth of the seedlings; nevertheless more researches are still required in this regard. In conclusion, peppermint could be considered as a natural herbicide for future weed control programs.

**Keywords:** Allelochemical compounds, Germination percentage, Vegetative growth, Allelopathy

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## Essential Oil Content and Composition of Different Plant Parts of Native and Imported *Cannabis Sativa* L. in Iran.

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*Cannabis sativa* L. which belongs to the family Cannabinaceae, is an annual herbaceous plant. Over 200 different terpenoids have been reported in *C. sativa* which is isolated from the essential oil of flowers, leaves and glandular trichomes. Since the variation and yield of terpenoids depends on the *Cannabis* varieties, plant part and harvesting stage, in this project the seeds of 4 different *C. sativa* included one import varieties from Germany (Fedura 17) with its progenies (F1) and two native populations from Fars and Yazd were cultivated in the field of Alborz research station, Karaj, Iran. However, for investigating essential oil content and composition, the aerial parts of them were collected at vegetative, full flowering and plant seeding stages and dried in shade (room temperature) and their essential oils were obtained by hydro-distillation. The oils were analyzed by GC and GC/MS. Based on the results, the oil yield varied from 0.21% in flowers of Fedura 17 to 0.76% in Female Yazd population (w/w based on dry weight). Twenty nine components were characterized with E-caryophyllene as major compound in all varieties and stages (16.37% in seeding stage of Yazd population to 44.71% Fedura14 during vegetative growth). Also,  $\alpha$ -humulene and Z-caryophyllene were the main compounds in the oil at vegetative stage. Major components in mail flowers of native populations were limonene and cubenol. In addition to E-caryophyllene, compounds such  $\alpha$ - and  $\beta$ -pinene in seeding stage of Fedura17 and its progenies (F1) were the other main components. p- cymene and linalool are the minor compounds in vegetative growth of Fedura 17 and its progenies (F1), respectively.

**Keywords:** *Cannabi sativa*, Essential oil, E-caryophyllene,  $\alpha$ -pinen,  $\beta$ - pinene

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## The Effect of Chickpea (*Cicer arietinum* L.) and Coriander (*Coriandrum sativum* L.) Intercropping on Components of Coriander Essential Oil.

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In order to study the effect of chickpea (*Cicer arietinum* L.) and coriander (*Coriandrum sativum* L.) intercropping essential oil of coriander, a split plot experiment based on completely random design with three replications was carried out at Shahid Beheshti reserch filed of university of Jiroft during 2013-14. Two levels of weed managements ( $W_1$  and  $W_2$ : with and without weed) and five different levels of intercropping systems ( $N_{100}$ ,  $G_{100}$ ,  $N_{33}G_{67}$ ,  $N_{50}G_{50}$ ,  $N_{67}G_{33}$ : cicer and coriander percent) were primary and secondary treatments respectively. The results showed that linalole as an important subsequence were 65.2, 74.4, 83.7 and 63.4 percentage in 0:100, 33:67, 50:50 and 67:33 treatment respectively. Incrising cicser plants number up to 50% in the intercropping systems showed 28.4% linalole more than coriander sole cropping. According to this reaserch intercropping system can incrise essential oil of coriander.

**Keywords:** Chickpea, Coriander, Essential oil, Intercropping, Linalole

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## Phytochemical Analysis of *Zataria Multiflora* Boiss. In Vegetative Stage in Fars and Khuzestan Provinces.

**Vahid Farej, Damon Razmjoue**

Production Active ingredients Medicinal Plants Guided by genetic processes, but is strongly influenced by environmental factors. *Zataria multiflora* Boiss. one of the most important Family Medicine Types Laminase And endemic regions of southern Iran, Afghanistan and Pakistan. In order to investigate the phytochemical properties of essential oil in vegetative stage, vegetative organs were collected from Khalil Baigarsanjan forest and Khayez Behbahan Mountains, respectively, in Fars and Khuzestan provinces, extraction of essential oil by water distillation was carried out. The results showed that the highest percentage of essential oil yield was 2.43% in the Khalil Beyg Arsanjan forest region. The highest number of combinations, 28 compounds were identified in the Khuzesh region, which comprised 99.75% of the sum of essential oil compounds. P-Cymene, Thymol and Carvacrol were the most important components of essential oil in the studied regions. In addition to them,  $\gamma$ -Terpinene was recognized as the major component of  $\beta$ -Caryophellen in the mountainous region of Khuzestan province as an important compound. While they were not identified in Khalil Bayg Arsanjan Forest. Considering the essential oil yield and the high amount of thymol, carvacrol, p-cyanam and its importance in pharmaceutical industries, the use of this plant for medical and sanitary purposes is recommended.

**Keywords:** Khalil Beyg forest, Mountain Khaeez, *Zataria multiflora* Boiss,  $\beta$ - Caryophellen,  $\gamma$ -Terpinene.



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## Composition of the Volatile Oil of Cultivated *Achillea tenuifolia* Lam. (Origin: Kordestan/ Iran).

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*Achillea tenuifolia* Lam. from Asteraceae family is an important medicinal and aromatic plant in Iran, which have considerable secondary metabolites, especially essential oil. The aerial parts of different *Achillea* species are widely used in folk medicine because of numerous pharmacological properties, like antioxidant, antispasmodic, antibacterial and anti-inflammation. In this study, the seeds of *Achillea tenuifolia* Lam. that was collected from Kordestan province (West Iran) were cultivated in the field of Alborz Research Station, Karaj, Iran. In order to compare of essential oil content and composition, flowering shoots and individual plant parts include flowers, leaves and stems were collected in full flowering stage. Composition of the volatile oils of different parts of *Achillea tenuifolia* Lam. was investigated by GC and GC/MS. The range of essential oil yield of different plant parts was 0.3% to 1.2%. Twenty seven components were characterized that germacrene D was the major compound in all parts of plants. Also, phytol, methyl hexadecanoate and 14-hydroxy- $\alpha$ -muurolene were the main compounds of flowering shoots and stems. In addition to germacrene D, compounds such as camphor (6.8%) and 1,8-cineole (6.7%) in flowers oil and viridiflorol (6.5%) in leaf oil were the other main components.

**Keywords:** *Achillea tenuifolia* Lam., Essential oil, Germacrene D, 1,8-cineole

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## Saffron Pollen Extract and Skin

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Saffron (*Zaferan*), botanical name *Crocus sativus*, is the most expensive spice in the world. It is derived from the dried stigma and pistil of the purple saffron crocus flowers. Iran is the largest saffron producer accounting for more than 80% of the world's production. Saffron contains an aeroallergen that causes reactive respiratory allergic reactions in atopic subjects. IgG antibody to allergens in the serum of allergic patients is not routinely measured. In this study in order to find out more about mechanism of allergy against saffron pollen, specific antibodies (IgE and IgG, total and subclasses) in atopic subjects were assayed. We used an ELISA assay for measuring specific IgE and IgG against saffron pollen extract in the sera of 38 atopic subjects (test group) and 20 non allergic subjects (control group). The optical densities were compared between allergic subjects and non-allergic individuals. The prick test with saffron pollen extract was used to evaluate the cutaneous and specific antibody responses in the allergic subjects. The correlation was determined by statistical analysis. Specific saffron pollen IgE and IgG subclasses were found significantly higher in the allergic subjects than the control group. The immediate skin reaction was found positive in 70% of the test group. We report here, the existence of a positive correlation between specific IgE and skin reaction by prick test in atopic subjects ( $R=0.433$ ). A negative correlation between specific IgE and IgG4 subclass was also found ( $R=-0.576$ ). These data may be useful to understand the mechanism of allergy to saffron and may help in clarifying clinical manifestations and to prevent IgE production as well as therapeutic application.

**keywords:** Saffron- Saffron pollen extract-Skin-IgE-IgG- *Crocus sativus*

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### Evaluation of Sedative-Hypnotic Effects of Aqueous Extract of *Haplophyllum Acutifolium* in Mice.

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Insomnia and sleep disorders are problems of modern life. Currently available sedative-hypnotic medicines can cause unwanted effects such as tolerance, dependency, amnesia, and rebound insomnia. In the recent years, using medical plants has increased because of their less undesirable effects compared to the chemical drugs. The present study was designed to investigate the sedative-hypnotic effect of *Haplophyllum acutifolium* (Rutaceae). The effects of aqueous extract of *Haplophyllum acutifolium* were evaluated by pentobarbital and open field tests in male NMRI mice. Each test was an experimental study on 32 mice which were randomly divided into 4 groups including saline (control), and 3 test groups. In the test groups animals received 50, 100, and 200mg/kg of aqueous extract of *Haplophyllum acutifolium*. In pentobarbital test, all the test compounds were injected intraperitoneally (IP) 30 minutes before pentobarbital administration. Duration of pentobarbital-induced loss of righting reflex was recorded as sleeping time. In open field test, similar to pentobarbital test, 30minutes after IP administration of compounds or saline, animals were placed in the open field arena and videotaped for 10 minutes. The videos were analyzed by Ethovision software and total distance moved by mouse during 10-minute period was measured. Aqueous extract of *Haplophyllum acutifolium* increased the duration of pentobarbital –induced sleep at doses of 50, 100, and 200mg/kg. Similarly, the extract at doses of 50, 100, and 200mg/kg decreased the total distance moved. The present data demonstrated that *Haplophyllum acutifolium* potentiates sleeping behaviors and also have sedative effects. Several alkaloids have been extracted from aerial part of the plant [1]. Further studies are necessary to find the active component(s) responsible for the sedative-hypnotic effects of the extract.

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### Phytochemical Investigation of Cultivated *Arnica chamissonis*.

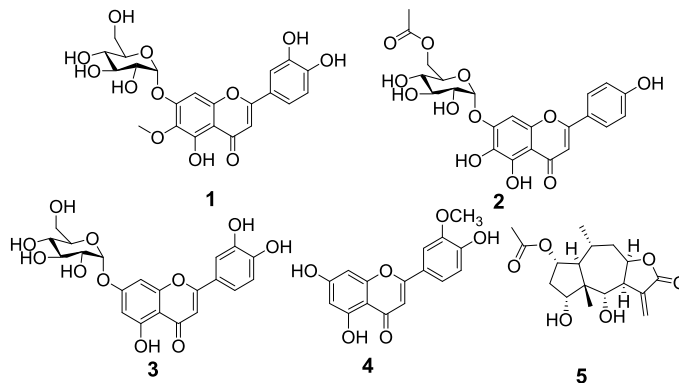
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*Arnica* belongs to Asteraceae family, is a perennial herb, native to the North of the United States and European Altitudes. The petals of *Arnica montana* L. and *A. chamissonis* ssp. *Foliosa* have been used in pharmaceutical, and cosmetics industries for their vast biological activity. It has been reported that sesquiterpenes lactones, flavonoids, and phenolic acids, are major class of compounds in petals of plant. The petals of plant have been used for treatment of bruising, sprains, muscle aches, wound healing, joint pain, and inflammation [1]. In this project the phytochemical investigation of hexane and ethyl acetate extract from petals of *A. chamissonis* investigated by HPLC-PDA-MS, GC-MS spectroscopies. The major compounds in the extract isolated by normal silica gel chromatography column and semi-preparative-HPLC. The structure of isolated compounds elucidated by application 1D and 2D NMR spectroscopy, UV-vis and HRMS. The major identified compounds were namely: Glucosyl-7-methoxy-6-luteoline (1), 5, 6, 7, 4' – tetrahydroxyflavone -7 -O - (6" -O -acetyl ) -β -D -glucopyranoside (2), luteolin-7-O-β-glucoside (3), chrysoeriol (4), chamysonolide (5) and nine fatty acids. The bioactivity of isolated compounds were tested in the tyrosinase enzyme.



Keyword: Asteraceae, Flavonoid, Sesquiterpenes lactones, Tyrosinase enzyme.

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## Phytochemical Analysis of the Ethyl Acetate Extract of *Daphne stapfii*

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Thymeleaceae family constitutes of 50 genera and 900 species that are widely distributed in Asia, Africa and Australia. *Daphne* (belongs to Thymeleaceae family) is a genus with 95 species shrub native to Asia. Plants of this genus are generally ornamental and very fragrant shrubs with significant pharmacological properties and are applied to strengthen the stomach, as an appetite, and for digestion in traditional medicine. A wide range of structurally diverse secondary metabolites have been identified in *Daphne* species, including coumarins, flavonoids, triterpenoids, lignin cumarinolignans, glucosides and specially daphnane-type diterpenes which showed interesting biological activities, such as antileukemic, skin irritant neurotrophic, antihyperglycemic, antifertility, pesticide activities, and curing bladder hyper-reflexia. The Iranian flora comprises five *Daphne* species, mostly distributed in desert areas of Yazd and Kerman provinces. In the present work, we have undertaken a phytochemical investigation on *Daphne stapfii*, one of the Iranian endemic species. Aerial parts of the plant were collected from Yazd province and extracted with ethyl acetate by maceration at room temperature. Fractionation of the extract on silica gel column chromatography, led to the isolation of two triterpenoids, namely  $\alpha$ -amyrin 1 and oleanoic acid 2. Their structures were elucidated by 1D and 2D NMR spectroscopy, and by comparison with literature data.

**Keywords:** Phytochemical, NMR spectroscopy, *Daphne stapfii*, Triterpenoid

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## Flaxseed/Soybean Intercrop Improves Yield and Land Use Efficiency.

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Medicinal plants play an important role in human health in the world. Many people in the developing and developed countries tend to take these drugs. Sustainable production of medicinal plants is very important, and intercropping is one of the components of sustainable production of these plants. Intercropping is broadly defined as the agronomic practice in which two or more crops are grown simultaneously in the same area of land [1]. Using intercropping systems increases yield, resource use efficiency, land equivalent ratio (LER), biodiversity and sustainability. Agricultural productivity was also increased by providing the resources that limit crop yield through irrigation and fertilization, and applying standardized chemical management strategies to protect crops from weeds, pests and diseases [2]. Thus, we assessed yield advantage and land use efficiency in flaxseed/soybean intercrops in the Hamedan region (Iran). Experiment was carried out in a randomized complete block design with three replications and four treatments. The treatments were included sole cropping of flaxseed and soybean, additive intercropping of 20% soybean with flaxseed and replacement intercropping of 3 rows of sesame: 4 rows of soybean (60% flaxseed:40%soybean). Results indicated that the grain yields of flaxseed and soybean were significantly affected by the planting patterns. Maximum grain yield of flaxseed was obtained at the treatment of additive intercropping of 20% soybean with flaxseed. LER index was >1 in intercropping treatments. The highest value for LER (1.89) was revealed at 20:100 (soybean/flaxseed intercrop). This concerns the optimum use of nutrients by crops from different depths of the soil due to the different root structure and the N<sub>2</sub> fixing by soybeans in the soil that is gradually released to the flaxseed.

**Keywords:** Flaxseed, Intercropping, Land equivalent ratio, Soybean, Yield

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## Phytochemical Responses of Lemon Balm (*Melissa officinalis* L.) to Foliar Application of Gibberellic Acid and Benzyladenine under Different Nutritional Conditions.

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Due to its various advantages, in recent years application of soilless cultures in production of agricultural plants has gained popularity and use of these systems for commercial production and research purposes of medicinal plants is already developing. In this study, phytochemical responses of lemon balm (*Melissa officinalis* L.) to foliar application of gibberellic acid and benzyladenine were investigated under different nutritional conditions in hydroponics. The experiment was conducted in a split plot factorial based on the complete randomized block design with three replications. The main factor consisted of three nutrient solution formulations and the sub-factor composed of factorial combination of foliar GA<sub>3</sub> (0 and 100 ppm) and BA (0, 50 and 100 ppm). Results showed that antioxidant activity and the essential oil content of the plant were significantly affected by the type of nutrient solution formulation. Also, the effect of GA<sub>3</sub> on phenolic compounds and the oil content and yield was significant and application of BA significantly influenced total phenolics and antioxidant activity. Increasing BA concentration led to an increase in phenolics compounds and plants treated with 100 ppm BA contained the highest level of total phenolics (48.13 mg GAE/g DW). The highest antioxidant capacity was observed in plants grown in nutrient solution No. 3 without application of GA and BA. Plants grown in Hoagland's solution and receiving 100 ppm GA exhibited the highest essential oil content (0.26%). The highest oil yield was also obtained from plants grown in Hoagland's and nutrient solution No. 3 and treated by 100 ppm GA.

**Keywords:** *Melissa officinalis* L., Gibberellic acid, Benzyladenine, Nutrient solution,

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## Evaluation of Antimicrobial Activity of *Stachys lavandulifolia* Essential Oil in Iranian Yoghurt Drink.

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Increasing awareness of the relationship between diet and disease has led to greater emphasis on foods capable of meeting basic nutritional requirements while providing additional physiological benefits. Iran is the source of a large number of the medicinal plants that are currently in use throughout the country. These plants have great potential due to their prevalence, nutritive value and biologically active components. Despite these potentials, they have not found use in food products. There is a tremendous potential to add value to these medicinal plants by promoting them as a source of high-value functional ingredients for use in food processing and preservation. *Stachys lavandulifolia* is widely used in Khorasan province as a herbal tea. It is used for the treatment of gastrointestinal and respiratory disorders. The aim of this study was to investigate the antimicrobial effect of *Stachys lavandulifolia* essential oil on growth of mold and yeast and total counts of bacteria. The essential oil of *Stachys lavandulifolia* which extracted by Clevenger apparatus was added in the levels of 0.001%, 0.003% and 0.005% to the pasteurized yoghurt drink samples which were packed in 250 ml containers. The samples stored at 4°C for 75 days and each 15 day subjected to microbial tests. The results showed the antimicrobial effect of different levels of essential oil was significant when compared with control group. The 0.001% level was effective in decreasing the growth and a significant difference was observed in treatments with 0.003 and 0.005%. However, there was no significant difference between the 60 and 75- days samples. Yoghurt drink samples that contain 0.005% essential oil showed more inhibitory effects against mold and yeast, and total counts of bacteria. According to the results of this study, it seems that essential oil of *Stachys lavandulifolia* has antimicrobial properties against mold, yeast and bacteria and it can be used not only as a flavoring agent but also as a natural additive for yoghurt drink.

**Keywords:** Antimicrobial activity, Essential oil, *Stachys lavandulifolia*





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## The Effect of Different Levels of Dietary Oregano Powder on Growth Performance of Broilers.

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The widespread use of antibiotics as growth promoters and for disease prevention in poultry production has been caused to development of antibiotic resistance. Therefore, the use of antimicrobial growth promoters has been forbidden in the European Union since 2006. Nowadays, many phyto-genic plans have been evaluated and tested as alternatives to chemical antibiotics for poultry. Oregano with the scientific name *Mentha longifolia* is a medicinal plant of *Laminaceae* family which is used in traditional medicine for treatment of nausea, Bronchitis, bloat, anorexia, colon ulcers and digestive and hepatic disorders. Also, oregano is a plant grown for culinary purposes and generally improves the organoleptic characteristics of food. Thymol and Carvacrol are the two main Phenolic compounds which constitute up to 80% of oregano essence and are responsible for its antioxidant activities and have been recognized as potent antimicrobial compounds. It has been reported that the dietary oregano powder supplementation significantly ( $P<0.05$ ) increased average daily feed intake and body weight gain of broilers during grower and entire production period. In this study, a total of 480 one-day old Ross 308 broiler chicken were randomly allocated to 6 treatments, 5 replicates and 16 birds in each replication. The experimental treatments included control (with no feed additive), 0.02% Virginiamycin as growth promoter antibiotic, and 0.25%, 0.50%, 0.75% and 1.0% oregano powder. Feed intake, body weight, body weight gain, and feed conversion ratio (FCR) were recorded weekly. The data were analyzed in a completely randomized design using the GLM procedure of SAS. Comparison of means was conducted by Duncan's multiple range test. The results of the present study showed that in different and also whole experimental period, the use of 0.25% and 0.50% dietary oregano powder significantly ( $P<0.05$ ) increased feed intake and body weight gain whereas the utilization of 1.0% dietary oregano powder significantly ( $P<0.05$ ) reduced these two indices when compared to other treatments but had no significant effect on FCR of broilers. Although the number of taste buds in birds is less than of mammals, however the chicks are able to feel the feed taste to some extent. Since oregano contains thymol and carvacrol as the main Phenolic compounds which have bitter taste [3], the high levels of dietary oregano powder may result to bitter smell of the diet and thereby influence on appetite and reduce feed intake and performance of broiler chickens.

**Keywords:** Oregano powder, Performance, Broilers

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[1] Giannenas, I.; Tzora, A.; Sarakatsianos, I. *Ann. Anim. Sci.* **2016**, *16*, 779–796.

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## Study the Relationships Between Traits of Sesame in Non-stress and Drought Stress Conditions.

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Sesame seeds are an excellent dietary source of calcium and are used in various forms for food preparation in Africa, the Orient, Asia and India. In addition, the high-quality sesame oil made by pressing sesame seeds is almost neutral in its aroma and is very stable. Traditional Chinese medicine holds that sesame strengthens the life energy. Sweetmeats made of sesame seeds and honey are thought to maintain women's fertility and sexual health. Drought is the most important abiotic factor limiting growth, adversely affect growth and crop production. Yield a complex quantitative traits and is controlled by a large number of genes, so environmental factors such as drought stress have a great effect on it. In the early stages of improving programs it is better to use the determinant components of yield for plant selection. Therefore to study the relationships between sesame yield and yield components, a field experiment was conducted in a split plot trial based on randomized complete block design with three replications during 2016. In this experiment two factors including irrigation regimes (main factor) and sesame cultivars (sub factor) were examined. Irrigation regimes in two levels, including irrigation after depletion of 40% and 80% of soil available water (full and low irrigation, respectively) in the main plots and 6 sesame cultivars in sub plots were considered. The results showed that, among all studied traits in non-stress conditions, the highest correlation was observed between grain yield and water use efficiency and nitrogen utilization efficiency. In these conditions, there was a positive and significant relationship between grain yield and oil yield, protein yield, capsule length and seed number per plant. In stress conditions, the highest correlation was observed between grain yield and water use efficiency and nitrogen use efficiency. In these conditions, there was a significant positive correlation between grain yield and oil yield, protein yield and harvest index. Based on stepwise regression results in non-stress conditions respectively, oil yield, 1000 seed weight, number of seeds per capsule and number of capsules in plant, and in stress conditions respectively, oil yield, protein yield and nitrogen percentage had the greatest impact on grain yield.

**Keywords:** Drought Stress, Traits relationships, Sesame, Stepwise Regression

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## The Effect of Different Levels of Dietary Oregano Powder on Carcass Characteristics of Broilers.

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Antibiotics have been extensively used in human and veterinary medicine. However, antibiotic residues have been found in poultry meat and egg and the consumption of poultry products containing antibiotic residues is resulted in antibiotic resistance and is harmful for human health. Thus, the utilization of growth promoter antibiotics has been banned in the European Union since 2006. Currently, there is considerable interest in replacing natural alternatives to antibiotics for poultry production. One of these alternatives is phytochemicals. Oregano with the scientific name *Mentha longifolia* is a medicinal plant belongs to *Lamiaceae* family and is used for medical and culinary purposes. Oregano oil is derived from the plant leaves and is used in the industry because of its high antioxidant capacity. Thymol and Carvacrol are the two main Phenolic compounds in oregano essential oil which have antioxidant and antimicrobial properties. It has been reported that the use of dietary oregano essential oil supplementation resulted to significant increase ( $P<0.05$ ) in broilers breast and thigh meat antioxidant capacity compared to control group. In the current study, a total of 480 one-day old Ross 308 broiler chicken were randomly assigned to 6 treatments and 5 replicates of 16 birds in each. The experimental treatments were control (with no feed additive), 0.02% Virginiamycin as growth promoter antibiotic, and 0.25%, 0.50%, 0.75% and 1.0% oregano powder. At the end of experimental period (42 day of age), two birds from each cage with the closest body weight to the cage mean weight were selected and slaughtered after recording their live body weights and their carcass, breast, thigh, liver, and abdominal fat weights were measured in proportion to live body weight. The data were analyzed in a completely randomized design using the GLM procedure of SAS. Comparison of means was conducted by Duncan's multiple range test. The results of this study showed that the effect of experimental treatments was not significant on carcass, breast, thigh, and liver percentage but the use of 1.0% dietary oregano powder resulted to significant ( $P<0.05$ ) reduction in abdominal fat percentage. It has been reported that the dietary inclusion of lemon balm had no significant effect on carcass traits of broilers. The decrease in abdominal fat percentage can be due to bitter smell of diet containing 1.0% oregano powder which decreases feed intake and hence lipogenesis and increases gluconeogenesis caused reduction in abdominal fat percentage.

**Keywords:** Oregano powder, Carcass characteristics, Broilers

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## Characterization of the Volatile Composition of Essential Oils of *Artemisia turcomanica* and *Artemisia kopetdaghensis*

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The genus *Artemisia* L., usually displayed by small herbs and shrubs, is one of the largest genera in the Compositae family consisting of more than 500 species, which is widely distributed in the northern temperate region of the world [1]. Aromatic plant species of genus *Artemisia* are important medicinal plants, highly recommended due to their biological and therapeutic properties including antitumor, antitoxin, antiseptic, antimicrobial, antifungal, antimalarial, relieving cough, invigorating blood circulation, stopping pain, for the treatment of infectious wounds, indigestion, and digestive problems [2,3]. Because of the morphological and chemical diversity, and special pharmacological properties ascribed to *Artemisia* species, there is an urgent need to improve and update the chemical knowledge on these aromatic plants. This research was conducted to characterize the volatile composition of the essential oils of *A. turcomanica* and *A. kopetdaghensis* collected at flowering stage from natural habitats in northern Iran. The yellowish oils were extracted by hydro-distillation from the flowering aerial parts of *A. turcomanica* and *A. kopetdaghensis* in yields of 0.82% and 1.56% (w/w), based on dry weights, respectively. The oils were analyzed by means of gas chromatography (GC-FID) and gas chromatography/mass spectrometry (GC-MS). Twenty-six constituents were identified in *A. turcomanica* oil by cis-thujone (28.8%), trans-thujone (18.2%), 1,8-cineole (18.9%) and camphor (13.6%) as the main compounds. Thirty-four components were characterized in *A. kopetdaghensis* oil with 1,8-cineole (26.0%), santolina alcohol (15.6%), camphor (13.4%) and santolinyl acetate (8.7%) as the major compounds.



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## Study Quantitative and Qualitative Yield of Sesame in Two Different Irrigation Conditions.

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Herbal medicines are popular in the treatment of many diseases. They are safe and easily available. Different oil seeds like groundnut, mustard, rapeseed and sesame seed and substantial quantity of edible oils is consumed around the world. Sesame is widely known oil crop of Pedaliaceae family with high-quality. Sesame seeds also contain two unique substances: sesamin and sesamol known to have a cholesterol lowering effect in humans and to prevent high blood pressure. Drought Stress is the most common environmental stress that is almost limited to 25 percent of agricultural lands for agricultural farm products in the world. Drought is a risk to successful production of crops worldwide and occurs when a combination of physical and environmental factors causing stress in plants and thus reduce production. In order to investigate the effect of drought stress on growth and morphological traits of sesame, a split plot experiment based on randomized complete block design with three replications during 2016 was conducted. In this experiment two factors including irrigation regimes (main factor) and sesame cultivars (sub factor) were examined. Irrigation regimes in two levels, including irrigation after depletion of 40% and 80% of soil available water (full and low irrigation, respectively) in the main plots and 6 sesame cultivars in sub plots were considered. The sesame cultivars including Halil, Dashtestan 2, Darab 1, Oltan, Yellow White and NazTakShakhe. The studied traits were biological yield, grain yield, oil yield and protein yield. The results of analysis showed that irrigation and cultivar effect on all traits were significant, while interaction of irrigation and cultivars was significant only in grain yield, oil yield and protein yield. The highest grain yield and oil yield were obtained in Oltan and Dashtestan 2 cultivars under full irrigation conditions and the highest protein yield in Oltan cultivars under full irrigation conditions.

**Key words:** Drought Stress, Grain yield, Oil Yield, Protein Yield

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## Rumex Alveollatus Hydroalcoholic Extract protects CCL4-Induced Hepatotoxicity in Balb/c Mice.

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Rumex alveollatus is proposed to contain flavonoids, a group of antioxidants that exert their protective effects against free radicals. Carbon tetrachloride is a factor that damages the liver. This study was carried out to explore the protective effects of Rumex alveollatus on the liver damage induced by carbon tetrachloride in mice. In this experimental study, 30 male mice (35±4) were divided into 5 groups, each with 6 mice. The negative control group was administered 0.5 ml olive oil, positive control group was administered 2 ml/kg carbon tetrachloride plus olive oil at 1:1 ratio for 4 days, and the experimental groups were administered 2 ml/kg carbon tetrachloride and Rumex alveollatus extract at 150, 300 and 450 mg/kg for 4 days. All administrations were done intraperitoneally. Twenty days later, blood samples were taken from the heart and liver serum enzymes (ALT, AST and ALP) were measured. After sacrificing the samples, liver samples were fixed in formalin to prepare the histological sections. Then, factors such as liver volume, hepatocytes, sinusoids, central veins, portal vein, bile duct and hepatic artery were measured. Rumex alveollatus extract (450 mg/kg) reduced the serum level of all three liver enzymes (p<0.05). At this dose, the volume of sinusoids, hepatocytes and bile duct decreased significantly (p<0.05), but the volume of portal vein and central vein increased significantly (p<0.05). Rumex alveollatus extract has protective effects against carbon tetrachloride-induced damages in liver.

**Keywords:** Rumex alveollatus, Carbon tetrachloride, Stereology, Liver

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**The Effect of Different Levels of Dietary Oregano Powder on Immunity System Status of Broilers.**

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In the new century, the use of most growth promoter antibiotics has been forbidden by the European Union due to their side effects such as antibiotic residues in poultry products and development of antibiotic resistance. The medicinal plants and their extracts have received increasing attention as possible alternatives for antibiotics. Oregano with the scientific name *Mentha longifolia* is a medicinal plant from *Laminaceae* family which is used for medical and culinary purposes. The major components of oregano essence are terpenoid compounds such as thymol and carvacrol which have antimicrobial and antioxidant properties. It has been reported that the beneficial effects of essential oils should not only arise from their antimicrobial properties but also from their contribution in immune system function. In the present study, 480 one-day old Ross 308 broiler chicken were randomly allotted to 6 treatments, 5 replicates and 16 birds per each replication. The experimental treatments consisted of control (with no feed additive), 0.02% Virginiamycin as growth promoter antibiotic, and 0.25%, 0.50%, 0.75% and 1.0% oregano powder. At 16 day of age, Newcastle disease vaccine was administered orally to all chicks and 6 days thereafter, blood samples were taken from two birds of each cage via wing vein for determination of antibody titer against Newcastle vaccine. At the end of experimental period (42 day of age), two birds from each cage, close to the cage average weight were selected and slaughtered after recording their live body weights and their thymus, spleen and bursa of Fabricius gland weights were measured in proportion to live body weight. The data were analyzed in a completely randomized design using the GLM procedure of SAS. Comparison of means was conducted by Duncan's multiple range test. The results of current study indicated that the experimental treatments had no significant effect on thymus, spleen and bursa of Fabricius percentage. It has been reported that dietary oregano powder supplementation had no significant effect on the organ weights of broilers immune system. The antibody titer against Newcastle vaccine in group fed diet containing 0.5% oregano powder was significantly ( $P < 0.01$ ) higher and in chicks fed diet containing 0.02% Virginiamycin was significantly ( $P < 0.01$ ) lower than those of other treatments. It seems that the reduction in population of intestinal bacteria which stimulate the production of immunoglobulin is the main cause behind the decline of antibodies by feeding antibiotics.

**Keywords:** Oregano powder, Immunity system, Broilers.

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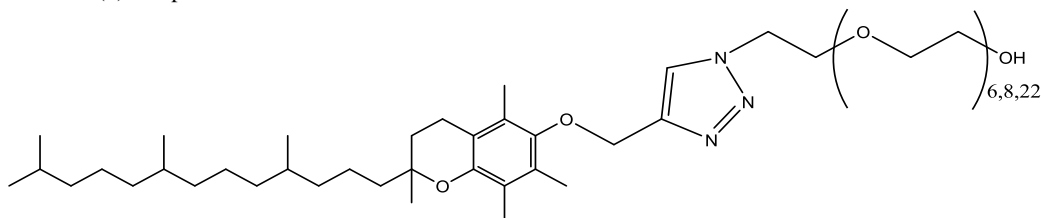
**Synthesis of New Pegylated Derivatives from Vitamin E; Application as a Nanocarrier in Drug Delivery for Paclitaxel Loading and Evaluation of It's Biological Properties.**

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Low water solubility of pharmaceutical agents is always considered as a main disadvantage for most of the potent anti-cancer drugs such as paclitaxel and docetaxel due to their bulky polycyclic structures. Various drug delivery systems, such as polymeric or inorganic nanoparticles, liposomes and micelles, have been developed to solve this problem and further to promote sustained and controlled release of anti-cancer drugs. Among them, micelles are used most often due to their technical ease, high biocompatibility and high efficiency in drug delivery. Micelles can encapsulate a drug of poor solubility in their hydrophobic core and enhancing its bioavailability. In this paper, the synthesis of different pegylated vitamin E derivatives by the use of a 1,2,3-triazole linker (1) is reported.



The ability of the synthesized derivatives to form micelles as a nanocarrier system for hydrophobic drugs, like paclitaxel was also studied. The anticancer activities of PEG 1000 g/mol derivative and its paclitaxel incorporated product against MCF-7 breast cancer cells were studied and the cell viability of two formulations in 20  $\mu\text{M}$  concentration were determined as 33% and 31% respectively.

**Keywords:** Pegylation of vitamin E, Click reaction, Micelle, Paclitaxel, Biological assay

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**Protective Effect of *Vaccinium arctostaphylos* L. Fruit Extract on Gentamicin-Induced Nephrotoxicity in Rats.**

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Kidneys play a key role in establishing physiological balance, regulating the water/electrolytes balance, disposing of metabolic and bioactive waste like many drugs and regulating arterial blood pressure via renin secretion. Aminoglycosides, as the frequently used antibiotics, are extensively used owing to advantages such as inexpensiveness and availability. Reactive Oxygen Species (ROS) induce cell membrane peroxidation, protein denaturation, DNA damage, apoptotic induction and cell death. The present study was aimed to investigate the effect of *Vaccinium arctostaphylos* extract on renal toxicity induced by gentamicin in rats. *Vaccinium arctostaphylos* shows antioxidant properties and has anti-cancer and anti-inflammatory effects due to having anthocyanides. Among the compounds of this plant, delphinidine is also present, which reduces the destructive effects of free radicals. This anthocyanin exists in the extract of *Vaccinium arctostaphylos* fruit as well. In this experimental study, 25 rats were divided into five groups, including negative control (0.5 ml normal saline), positive control (80 mg/kg gentamicin and 0.5 ml normal saline) and three experimental groups receiving 100, 200 and 400 mg/kg of the extract and 80 mg/kg gentamicin. All administrations were done intraperitoneally for seven days. Thirty days after the first administration, blood samples were taken from the heart. Serum creatinine (Cr), urea (BUN), sodium and potassium levels were measured. To prepare histological sections, the kidneys were kept in 10% formalin. After preparing the histological sections, the volume of renal tubules (proximal and distal convoluted tubules, loop of Henle), renal vessels, interstitial tissue and the number and volume of renal glomeruli were measured. The volume of kidneys was measured by Cavalier method and the volume of tubules was measured by stereological volumetric method after estimating the tissue shrinkage. Physical dissector method was utilized to estimate the number of glomeruli in each kidney. The extract of *Vaccinium arctostaphylos* significantly increased the serum urea ( $p=0.023$ ) and creatinine ( $p=0.009$ ) levels and the volume of proximal convoluted tubules ( $p=0.02$ ), distal convoluted tubules ( $p=0.032$ ), loop of Henle ( $p=0.038$ ) and glomeruli ( $p=0.015$ ). Moreover, it significantly decreased the volume of vessels ( $p=0.009$ ) and interstitial tissue ( $p=0.001$ ). The 400 mg/kg dose of the extract exerted the highest effect. The hydroalcoholic extract of *Vaccinium arctostaphylos* fruit protected the kidneys against the gentamicin-induced toxicity. The antioxidants present in the fruit of this plant prevent damage to the cells of renal tubules, thereby helping the kidneys to maintain their normal performance.

**Keywords:** *Vaccinium arctostaphylos*, Gentamicin, Stereology, Kidney.

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**Antioxidant of the Root Essential Oil from *Smyrniun cordifolium* Boiss populations in Southwest of Iran.**

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*Smyrniun cordifolium* Boiss is a perennial plant belongs to Apiaceae family and encompasses 1 species which wild growing in the west and southwest of Iran. In the Iranian folk medicine the plant is widely used as diuretics and for treating of kidney stones. In this research, the antioxidant activity of root essential oil was investigated in ten accessions collected from their natural habitats through southwest Iran at full flowering stage. Samples dried in shade and essential oils were obtained by using a Clevenger apparatus. The antioxidant activity of the essential oil was evaluated using DPPH radical sequestering method ( $IC_{50}=0.33 - 8.59 \mu\text{g/ml}$ ). The highest antioxidant activity was obtained from Shah Qasem ecotype ( $IC_{50}=0/33 \mu\text{g/ml}$ ) and the lowest was obtained from Mahmoud Abad ecotype ( $IC_{50}= 8/59 \mu\text{g/ml}$ ).

**Keywords:** *Smyrniun cordifolium* Boiss, Antioxidant activity, Apiaceae.





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## The Effect of Chemical and Organic Nutrition on Morphological Traits and Essential Oil Yield of *Satureja Khuzestanica* Jamzad in Karaj Region.

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*Satureja khuzestanica* Jamzad is an endemic plant of Iran that is widely distributed in Southern part of Iran. It is famous for its medical uses as analgesic and antiseptic in folk medicine [1]. It has been reported to be antispasmodic, anti-diarrhea, vasodilator, anti-inflammatory, antihyperlipidemic and antioxidant. To find out the effect of nutritional treatments on quantity and quality yield of *S. khuzistanica*, a randomized complete block design with three replications was conducted in research farm of Research Institute of Forests and Rangelands (Karaj) in 2016-2017. Experimental treatments included eight chemical and organic fertilizer [control, N50, P25, K25 (kg/ha), cow manure (30 ton/ha), cow manure (60 ton/ha), N50, P25, K25 (kg/ha) + cow manure (30 ton/ha), N50, P25, K25 (kg/ha) + cow manure (60 ton/ha), vermi-compost (5 ton/ha), vermi-compost (5 ton/ha) + N50, P25, K25 (kg/ha)]. Result of this study revealed that cow manure (30 ton/ha) treatment had the highest amount of essential oil (3.2%). The highest dry matter (1360 kg ha<sup>-1</sup>) and essential oil yield (38.4 kg ha<sup>-1</sup>) were obtained in N50, P25, K25 (kg/ha) + cow manure (30 ton/ha) treatment. Among the morphological characteristics, the most height (26.2 cm), shoot number (38.2) and canopy width (102.7 cm) were observed in N50, P25, K25 (kg/ha) + cow manure (30 ton/ha) treatment. In conclusion, the results showed that the combination of low level of NPK with cow manure fertilizer can be more effective on vegetative characteristics, dry matter and essential oil yield of *Satureja khuzestanica*.

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## Biological Nutrition Increased Growth and Essential Oil Yield of *Satureja Khuzestanica* Jamzad in Karaj Region.

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*Satureja khuzestanica* Jamzad belonging to the Lamiaceae family is an endemic plant that widely distributed in the southern parts of Iran. It is used as a folk medicinal plant, because of its therapeutic value as an analgesic and antiseptic properties. Active ingredients of *S. khuzestanica* essential oil are carvacol, antioxidant and flavonoids with anti-oxidant and anti-thyroid properties. To find out the effect of nutritional fertilizers on some morphological traits and essential oil yield of *S. khuzistanica*, a randomized complete block design with three replications was conducted in research farm of Research Institute of Forests and Rangelands (Karaj) in 2016-2017. Experimental treatments included nine biological fertilizer (control, *Glomus mosseae*, *Glomus intraradaices*, *Azospirillum*, *Pseudomonas*, *Thiobacillus* + S<sub>0</sub>, *Thiobacillus* + S<sub>250</sub>, *Thiobacillus* + S<sub>500</sub> and *Thiobacillus* + vermi-compost (5 ton/ha)). Result of this study showed that the highest amount of essential oil (2.9%) was obtained in *G. intraradaices* treatment. The highest amount of dry matter (728.3 kg/ha) and essential oil yield (22 kg/ha) were determined in *G. intraradaices* treatment. Among the morphological characteristics, the highest height (24.8 cm) was found in *G. intraradaices* and the highest shoot number (30.6) and canopy width (3.90 cm) in *G. mosseae* treatment. Overall, the results showed that among biological treatment, *G. intraradaices* and *G. mosseae* treatments can be more effective in essential oil yield and morphological characteristics of *Satureja khuzistanica*, respectively.

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## Karyotype Analysis in Five Ajwain (*Trachyspermum ammi* L. Sprague) Ecotypes from Iran.

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The somatic chromosome number and karyotype of five Iranian Ajwain ecotypes (Ardabil, Karaj, Sadouq, Rafsanjan and Birjand) were analysed for the first time. Solutions of 0.05% colchicine and 0.002M 8-hydroxyquinoline were used for pre-treatment. The specimens were then treated with carnoy fixative solution for 72 hours. 1% Aceto-orcein solution was used for staining the chromosomes (for 3 hours). The specimens were then squashed and observed using Nikon ECLIPSE E200 microscope. At least 50 cells in metaphase stage were observed in each ecotype and picture of five cells with proper scattering of chromosomes were used for analysis. A diploid number (2n=18) was recorded in all the ecotypes. All the studied ecotypes showed predominance of metacentric and submetacentric chromosomes, with a low proportion of subtelocentric pairs. The chromosomes are generally small with a mean size ranging between 1.73 and 4.7  $\mu\text{m}$ . Short chromosomes were particularly found in Birjand ecotype. All the karyotypes had relatively high symmetry and were classified as 2A Stebbins's asymmetry type. The idiogram for ecotypes were drawn using IdeoKar software and different chromosomal parameters and asymmetry indexes were calculated.[1,2]

**Keywords:** Karyotype analysis, Ajwain, Chromosome number, *Trachyspermum ammi* L.

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## Species Distribution Modelling of a Medicinal Plant: *Astragalus fasciculifolius* Boiss. Using Bivariate Statistical Model

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In face of global and climate changes, understanding the species distribution is crucial for species conservation plans and sustainable habitat management. *Astragalus fasciculifolius* is a perennial medicinal species growing wild in natural landscapes of Fars Province. The main objective of this study was to assess the capability of a binary statistical model; frequency ratio (FR); to model the distribution and habitat suitability of *A. fasciculifolius* in Zagros Mountain, Fars Province. Using field surveys, the geographical location of this species was recorded and assumed as dependent variable. Geo-environmental variables were selected and mapped in Geographic Information System (GIS) as independent predictors in FR model. The results revealed that mean annual rain < 351.8 mm, temperature in the range of 15.85-17.40, slope angle of 14-22°, elevation class of 1,902-2,072 m, slope aspects of west and north, the flat plan curvature, sand class of 48-59%, clay class of < 45%, bulk density class < 1.26 g/cm<sup>3</sup>, organic carbon > 1.6%, nitrogen in the range of 0.23-0.39% and electrical conductivity < 0.73 dsm-1 had the highest FR values. Finally, according to FR model, habitat suitability map of *A. fasciculifolius* was prepared and classified into four classes including, low, moderate, high, and very high. The classified suitable habitats showed that the high and very high suitable areas covered 14.2 and 4.3% and low and moderate classes covered 55.7 and 25.8% of the study area, respectively. In traditional medicine, *A. fasciculifolius* is used as a herbal remedy for putrescent abscesses, eye inflammations, and other uses. The method used in this study could be recommended to local managers and national conservation agencies as a reliable tool to predict the suitable habitats of *A. fasciculifolius* and other vulnerable plant species for restoration objectives.

**Keywords:** Frequency ratio, Species distribution modelling, *Astragalus fasciculifolius*



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## Effect of Methyl-Jasmonate (Meja), Yeast Extract and Salt Stress on Cichoric Acid Content and Biomass Production in *Echinacea Purpurea*

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*Echinacea purpurea* is a perennial medicinal herb belonging to the Asteraceae (Compositae) family. It is one of the most important and well-known medicinal plants in the world with immunostimulatory and anti-inflammatory properties which has been mainly used for infectious diseases in both upper and lower respiratory systems. The contents of cichoric and caftaric acid were determined in aerial part and root. In this study, the effects of the methyl-jasmonate (MeJA), yeast extract (YE) and salt stress on the growth and Cichoric and caftaric acid contents of *E. purpurea* were investigated. The results showed that various concentrations of NaCl stresses (50, 100, 150 mM), MeJA (75-100  $\mu$ M) and YE (60-120-180 g/L) have different eliciting influences. Cichoric and caftaric acid contents in roots and aerial part differed significantly between the treatments. The increase of cichoric and caftaric acid content induced by the elicitation of 60 and 120 g/L of YE was about 2.1- and 3-fold, respectively, as compared with that of the control. YE (biotic elicitor) was more effective in enhancing cichoric and caftaric acid contents than MeJA or NaCl (abiotic elicitor).

**Keywords:** *Echinacea purpurea*, Methyl-jasmonate (MeJA), Yeast extract, Cichoric acid

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## Cytotoxic Effect of Methanolic Extract and Its Fractions of *Stachys Pilifera* Benth Against HT-29 Human Colon Cancer Cells

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*Stachys pilifera* Benth (Lamiaceae) is used in traditional medicine to treat a variety of diseases. Despite some reports about the antitumor effects of some species of this genus, there is no available information about this effect in *S. pilifera*. The cytotoxic effect and antitumor mechanisms of methanolic extract of *S. pilifera* and its alkaloid and terpenoid fractions on the HT-29 colorectal cell line were examined. HT-29 cells were cultured and then incubated in the methanolic extract of *S. pilifera* and its fractions with various concentrations for 24 hours. Cell viability was measured by MTT assay. Morphology of cells was evaluated by phase contrast microscopy. Furthermore, the effects of the indicated extracts were tested on some regulators of cell death and proliferation such as Caspase-8, Caspase-9, nuclear factor- $\kappa$ B (NF- $\kappa$ B), and Nitric oxide (NO). Cisplatin was used as positive control. The estimated IC<sub>50</sub> values of the methanolic extract, alkaloid and terpenoid fractions and Cisplatin against HT29 cell after 24 h were determined 612, 48.12, 46.44 and 4.02  $\mu$ g/ml, respectively. Morphological changes such as plasma membrane blebbing, change in cell size, and apoptotic bodies were observed in cells treated with the extracts. *S. pilifera* extract and its fractions induced apoptosis by inhibition of NF- $\kappa$ B and NO, activation of active caspase-8, and caspase-9. Data showed the considerable cytotoxic and antiproliferative effects of *S. pilifera* on colorectal cell line through induction of apoptosis. These findings provide a basis for the therapeutic potential of *S. pilifera* in the treatment of colon cancer.

**Keyword:** *Stachys pilifera* Benth, HT29, Apoptosis, NF-  $\kappa$ B, Nitric oxide

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## The Effect of Various Environmental Factors on Antioxidant Activity and Phytochemical Diversity of Six *Papaver* Species

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The genus *Papaver* (poppy) belongs to the family Papaveraceae. Iran is one of the biodiversity centers of *Papaver* and there are more than 28 species found in Iran. *Papaver* species have traditionally been used to relax smooth muscle tone, making them potentially useful in the treatment of diarrhea and abdominal cramping. The extract has been used as a sedative analgesic and antitussive. This study was undertaken in order to examine the antioxidant activity, total flavonoid content and total phenolic content of poppy different organs (capsule, aerial parts and root) in 17 accessions. Antioxidant activity, total flavonoid content and total phenolic content were determined using 2, 2-Diphenyl-1-picrylhydrazyl (DPPH), aluminum chloride and folin-ciocalteu methods, respectively. The amounts of total phenolic and total flavonoid were significantly varied both amongst species and different plant organs ranging from 23.89 to 77.60 mg GAE/g DW and 1.34 to 4.58 mg Que/g DW respectively. Total phenolic content was in its highest value in the aerial parts of *P. bracteatum* (77.60 mg GAE/g DW), whereas the lowest level was found in the aerial parts of *P. arenarium* (23.89 mg GAE/g DW). Total flavonoid content was in its highest value in the aerial parts of *P. arenarium* (4.58 mg Que/g DW), whereas the lowest level was found in the capsules of *P. tenuifolium* (1.34 mg Que/g DW). The Antioxidant activity was widely varied in both species and different organs of the individuals ranging from 20.29 to 87.15 %. Antioxidant activity was in its highest values in the roots of *P. dubium* (87.15 %), whereas the lowest activity was found in the capsules of *P. dubium* (20.29%). These results showed that different species of *Papaver* are promising sources of natural antioxidants and other bioactive compounds beneficial to be used in the pharmaceutical industries.

**Keywords:** Poppy, Environmental Factors, Medicinal plant, Phytochemical

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## The Effect of Topping and Sparse Berry on Total Sugars, Regenerated Sugars, Vitamin C and TSS in Grapes.

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People who eat fruit as part of an overall healthy diet generally have a reduced risk of cardiovascular and cancerous diseases. Fruit are important sources of many nutrients, including vitamin C and total soluble solids. This experiment carried out to study the influence of pruning on the amount of these materials. In this research, shoot tipping (with two leaves and four leaves), leaf removing (three and six leaves from the bottom) and berry thinning in three different times (two weeks before full bloom, full bloom and two weeks after full bloom) were carried out in a factorial experiment based on randomized complete block design with two factors in four replications. SAS software was used for data analyses and the meanings were compared with the LSD test. The results showed that total sugars and reducing sugars in treatments had a significant difference with the control. Shoot tipping with two leaves at full bloom showed the highest total sugar content, and removing of six leaves at two weeks before full bloom showed the highest reduced sugars. But the amount of vitamin C and TSS did not differ significantly.

**Keywords:** Pruning, Total sugars, Vitamin C, TBS, Sugared sugars, Grapes.



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## Investigating the Effect of Organic and Biological Fertilizers on Yield and Some Quantity and Quality Characteristics of Medicinal Plant Mallow (*Malva sylvestris* L).

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Fertilizers management is an important factor in the successful cultivation of medicinal plants. In this study, the identification of suitable fertilizers and environmentally friendly development, which can have favorable effects on quantitative and qualitative indicators medicinal plant of *Malva sylvestris* L, has studied. In this regard, an experiment was performed as the three-agents factorial using vermicompost factors (zero and 10 tons per hectare), nitroxin (inoculated and non-inoculated) and biological super phosphate (Inoculated and non-inoculated) in base plan frame a randomized complete block with eight treatments and four replications in 2016 in the research field of Torbat Heidaried University. Comparison by Duncan mean comparison test conducted at 5% level. The results showed that the highest yield of dry leaves (657.75 kg ha), plant height and most of the growth yield of dried flowers (1574.58 kg per hectare) and grain yield (515 kg ha) was obtained by treating nitroxin. Most of the growth of leaves and lateral shoots per hectare and the highest number of flowers per hectare using combination treatments nitroxin with biological super phosphate was obtained while this treatment had caused producing the lowest yield of seed. The highest function leaf mucilage performance (4.2%) and the anthocyanins of flowers (106.59 mg) with combination treatment using nitroxin and vermicompost obtained. Studies have shown that it was the effect of treatments on leaf yield and grain weight index is not significant. The results showed that organic fertilizers (especially nitroxin) could be sustainable farming as a viable alternative to chemical fertilizers, used to produce medicinal plant of *Malva sylvestris* L.

**Keywords:** Nitroxin, Biological super phosphate, Vermicompost, Mucilage, Anthocyanin

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## Different Solvent Extract Affect Phytochemical Composition and Antioxidant Activity of *Nepeta binaludensis* cultivated in Mashhad.

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This study was designed to examine the phytochemical evaluation and antioxidant activity of the various extracts (hexane, methanol, ethanol, water and hydroalcohol) of cultivated *Nepeta binaludensis*. The research was conducted on the base of completely randomized design including three replications (1.5×2 m<sup>2</sup> plot) in research farm of Ferdowsi University of Mashhad, during 2017. The samples were subjected to a screening for their possible antioxidant activities by using 2,2-diphenyl-1-picrylhydrazyl (DPPH) assays. The IC<sub>50</sub> value of the *N. binaludensis* was determined to be 48.5 ± 2.46 µg/ml. Antioxidant capacity of ascorbic acid was also determined as a standard solution. The amount of total phenolic and flavonoids of the extracts was also determined. The highest in the respectively hydroalcoholic and hexane extract. Particularly, a positive correlation was observed between the flavonoids content and the antioxidant activity of the extracts. As estimated from the results, amounts of phenolic compounds were less in methanolic and hexane extracts than the others. In conclusion, antioxidant potentials of hexane extract could be attributed to the high phenolic contents. Based on the results of this experiment, various solvent extracts showed significantly differences properties.

**Keywords:** *Nepeta binaludensis*, Antioxidant activity, Total phenolic, Various extracts

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**Comparison of Clove Oil as an Anesthetic Drug on some Haematological Parameters of Grass Carp (*Ctenopharyngodon idella*).**

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Extract and essence of Clove oil (*Eugenia caryophyllata*) has been used as an anesthetic drug in aquaculture industry in last decade. In this study the effects of anaesthesia with MS222, Clove oil and 2-Phenoxyethanol on some haematological parameters of grass carp were investigated. Initially the effective dose of each anaesthetic drug were calculated in grass carp. Fish were anaesthetized with the calculated effective dose of each anaesthetic, then blood samples were taken at 1, 12, 24 and 72 hours after anaesthesia. Haematological parameters including Packed cell Volume, Hemoglobin, Red blood cell count, White blood cell count, WBC differentiated count, globular indices (MCV, MCH, MCHC) were calculated and compared among the groups. Results showed that most of haematological parameters didn't change in three anaesthetic treatments ( $P>0.05$ ). Leukocyte differentiated count showed significant differences among groups ( $P<0.05$ ). Neutrophils ratio increased in Clove oil and 2-Phenoxyethanol treatments at 12 and 24 hours after anaesthesia ( $P<0.05$ ), whereas lymphocytes ratio decreased in this groups. Other immunological parameters changed (But not in significant extent) in anaesthetic treatments. According the results of this study it can be concluded that Although MS222 induced minimum interaction with haematological parameters of grass carp, Clove oil induced similar effects to MS222 in most parameters and can be used as an alternative to MS222.

**Keywords:** Grass carp, MS222, Clove oil, 2-Phenoxyethanol, Haematological parameters

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**Effects of three Anesthetics: Clove Oil, MS222 and 2-Phenoxyethanol on some Immunological Parameters of Grass Carp (*Ctenopharyngodon idella*).**

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Tricaine methane-sulfonate (MS-222) is one of the most widely used anaesthetics for poikilotherms worldwide. Although It is the only anesthetic licensed in the United States for fin fish, it is too expensive to use in Iran. Then introduction of a proper natural origin alternative seems essential. In this study the effects of anaesthesia with MS222, Clove oil (*Eugenia caryophyllata*) and 2-Phenoxyethanol on some immunological parameters of grass carp were investigated. In the first phase of research the effective dose of each anaesthetics were calculated in grass carp. Fish were anaesthetized with the effective dose of each anaesthetic then blood samples were taken at 1, 12, 24 and 72 hours postanaesthesia. Serum samples prepared after centrifugation and non-specific immunological indices including serum lysozyme activity, serum bactericidal activity, serum total protein, albumin and Serum immunoglobulin were measured and compared among the groups. Results showed that most Serum lysozyme activity increased in Clove oil and 2-Phenoxyethanol treatments at 12 hours after anaesthesia ( $P<0.05$ ). Other immunological parameters didn't changed (or changed insignificantly) in anaesthetic treatments. According the results of this study it can be concluded that MS222 induced minimum interaction with non-specific immunological parameters of grass carp. Clove oil didn't change most of immunological parameters then can be used as a suitable alternative to MS222.

**Keywords:** Clove oil, Grass carp, MS222, 2-phenoxyethanol, Immunological parameters

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**Essential Oil Components, Phytochemical Analysis and Antioxidant Activity on Extract of *Phlomis Persica* Boiss. and *Phlomis Olivieri* Bent.**

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The *Phlomis* genus (Lamiaceae) comprises more than 100 known species distributed mainly throughout Eurasia and North Africa [1]. Plant is used as traditional treatments as mouth antiinflammator [2], analgesic, anti-infection digestive, throat infection [3,4]. *Phlomis olivieri* Benth. and *Phlomis persica* Boiss. are two medicinal species endemic to Iran [5]. The essential oil, isolated by hydro-distillation from the aerial parts of *Ph. olivieri* and *Ph. Persica* were analyzed using of gas chromatography-mass spectrometry (GC-MS). Essential oil percentage were 0.43% and 0.33% for *Phlomis persica* and *Phlomis olivieri*. In GC analyses of essential oils 38 compounds were identified that the main compounds were Diisooctyl phthalate (41.53 %), Caryophyllene oxide (18.17%), Copaene (10.62%) for *Ph. olivieri* Diisooctyl phthalate (47.74 %), Isoaromadendrene epoxide (16.18%), Fitone (7.82%) for *Ph. persica*. In the present study, three replication were used to statistical analysis using completely randomized designs by SAS software (ver. 13). The results from analysis of variance showed that total phenolic and flavonoid contents were significant at ( $p<0.01$ ). Total phenolics and flavonoids were (26.08 mg/g DW and 15.39 mg/g DW) and (91.09 mg/g DW and 32.97 mg/g DW) in *Ph. olivieri* and *Ph. persica* respectively. Also the results showed that antioxidant activity assay (DPPH) of the two species was significant at ( $p<0.05$ ), highest antioxidant activity were recorded in *Ph. persica* (55.35%) and lowest were obtained in *Ph. olivieri* with the 23.52%.

**Keywords:** *Phlomis olivieri* Bent., *Phlomis persica* Boiss, Essential oils, Antioxidant activity

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**Evaluation of the Risk of Genetically Modified Soybean by Comparing the Metabolites Profile of This Plant With Non-Genetically Modified Soybeans by HPLC-RF and GC-FID**

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Genetically modified foods (GMFs) are foodstuffs derived from genetically modified organisms (GMOs) whose genetic material has been manipulated by incorporating a gene that will express a desirable trait. Genetic engineering allows animals, plants and microorganisms to be genetically modified with novel characteristics beyond what happens through traditional breeding. The use of GMOs for enhanced crop yield, herbicide tolerance and modified product quality was started in the mid-1990s.[1] An important problem seems to be related to the safety assessment of new GM foods, which is initially based on the use of the concept of “substantial equivalence.” So the most important step is to identification of potential differences between the existing food and the new product, which should then be investigated further with respect to their toxicological impact.[2] Soybean is a plant belonging to Glycine in Leguminosae. This plant is one of the most important crops worldwide as a source of starch, dietary fiber, protein, lipids and essential minerals, which is genetically modified for various reasons. In order to evaluate the risk of genetically modified soybeans, the first step was to compare the amino acid profiles of the two equivalents of GM and non-GM soybeans, for this study we used acid hydrolysis extraction, and OPA derivation of amino acids then it was quantitative analyzed using RP-HPLC-RF. In the second step, the fatty acid profile of two soybean samples after digestion and Derivation to FAME was analysis by GC-FID. Finally, the amino acids and fatty acids profiles were compared in GM and non-GM samples in order to prove equivalence.

**Keywords:** Genetically modified organisms, HPLC-RF, GC-FID, Risk assessment

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**Isolation and Structure Elucidation of Secondary Metabolites from *Salvia macilenta* Boiss**

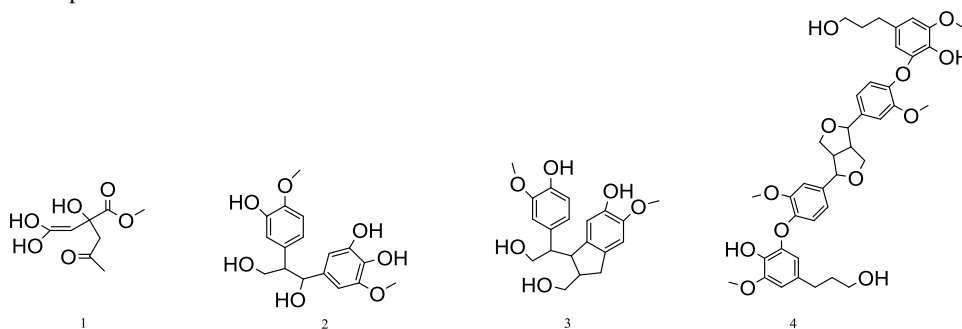
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The genus *Salvia* (sage) belongs to the Lamiaceae, includes nearly 900 species spread throughout the world. *Salvia* is the largest genus in this family and comprises about 61 species in Iran of which 17 are endemic to. The genus *Salvia* is generally known for its multiple pharmacological effects including anti-inflammatory, antipyretic, antioxidant, hepatoprotective and hypoglycaemic activities. *S. macilenta* Boiss. is an aromatic subshrub which grows wildly in Iran (Kerman, Hormozgan, Baluchistan, and Yazd provinces). Antioxidant activity, neuroprotective effect, antiglycating and antiapoptotic abilities of the plant has been studied. In the present work, we have undertaken a phytochemical investigation for the first time on *n*-Hexane-Ethyl acetate extract from the aerial parts of the plant and reported the isolation and identification of four new natural compounds (1-4). Structural elucidation of the compounds was accomplished by extensive spectroscopic methods including 1D and 2D NMR, and HRMS experiments.



**Keywords:** Lamiaceae, *Salvia Macilenta*, HRMS

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## Parallelism in the Effect of Rose Oil Softgel and Omeprazole Capsule on Manifestations of Gastro-Esophageal Reflux Disease: A Double Blind Randomized Controlled Trial

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Gastro-esophageal reflux disease (GERD) is one of the most common gastrointestinal complaints. The disease leads to troublesome symptoms such as heartburn and regurgitation and has a chronic, relapsing disease course. Among various natural compounds have been used in this condition, Rose oil, derived from Persian medical manuscripts and produced by maceration of rose petals in sesame oil for 25 days under sunlight, has been newly proposed as an effective treatment in gastric ailments. The study is a randomized double blind controlled trial in which rose oil softgel was compared with omeprazole capsules on GERD. The study population was 70 outpatients admitted to GI clinic of Rasoul Akram hospital. Each patient was visited by a gastroenterologist and GERD was diagnosed clinically. Inclusion criteria included: Patients between 16 to 80 years old, patients have at least 12 weeks history of GERD, no inclusion of patients with peptic ulcer. Exclusion criteria included: Appearance of drug adverse effects and loss of patient compliance. After achieving ethical code and registering the trial in Iranian Registry of Clinical Trials (IRCT), GERD patients enrolled to the study, filled out the written consent form and conditions of the research were explained. Thereafter, the patients were randomly divided into two 35-patient groups: Group one: Rose oil softgel (two softgels TDS) + one placebo capsule (once daily). Group two: one 20 mg omeprazole capsule (once daily) + placebo softgel (two softgels TDS). Three visits were accomplished for each patient; First admission, 10 days later and 20 days later. The Mayo gastro-esophageal reflux questionnaire (GERQ) was used to evaluate the manifestations in all three visits. Then, data gathering and analysis with SPSS were done. Results showed that Rose oil softgel can improve four important manifestations of GERD significantly; including number of heartburn episodes, number and severity of regurgitations, chest pain and odynophagia ( $p < 0.05$ ). However, it did not indicate any significant difference between two groups. According to the results, Rose oil can alleviate cardinal manifestations of GERD apparently. Moreover, as there is not any significant difference between Rose oil and omeprazole, Rose oil softgel can be used as a trustable powerful supplementary treatment along with proton pump inhibitors.

**Keywords:** Persian Medicine, GERD, Rose oil softgel, Omeprazole

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## Immunoprotective Effects of *Echinacea purpurea* in Rainbow Trout

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Usage of commercial antibiotics for disease treatment produces undesirable side effects, then looking for proper alternatives seems essential in animal farming particularly in aquaculture. The immunostimulating effects of *Echinacea purpurea* has been documented in mammals, but there are few works on immunostimulating effect of *E. purpurea* fish. Therefore in this study the effect of oral administration of *E. purpurea* essence on growth indices and immune responses of rainbow trout were investigated. One thousand two hundred rainbow trout fingerling ( $20 \pm 2$  g, Mean  $\pm$  SD) were divided in two groups, each in triplicate, in farm condition. Groups 1 were fed with food supplemented with 0.5% *E. purpurea* whereas group 2 fed with control food without supplementation. Fish in each treatment were fed with experimental diet for 60 days. At the end of experiment blood samples of 6 fish in each replicate were taken and hematological parameters (PCV, Hb, RBC, WBC, MCH, MCV, MCHC) and immunological parameters (Lysozyme and serum bactericidal activity, total protein and globulin) were compared among the groups. Results showed that growth indices (SGR, FCR, FER and PER) and some immunological parameters were significantly increased in fish fed with *Echinacea* supplemented food compare to control group, But hematological parameters and total protein and globulin didn't show any significant difference between groups ( $P > 0.05$ ). It can be concluded that Although oral administration of *E. purpurea* to rainbow trout in farm scale stimulate some growth and immunological indices, hematological parameters didn't affect by this supplementation.

**Keywords:** *Echinacea purpurea*, Rainbow trout, Growth indices, Immune response



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## Synthesis of Silver Nanoparticles Using Aqueous Extract of Capers (*Capparis spinosa*) and its Antiproliferative Effects on the Gastric Cancer Cell Line.

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The use of plants for the synthesis of nanoparticles is one of the most environmentally friendly methods for the non-use of toxic and polluting substances. The purpose of this study was to synthesize green nanoparticles of silver using a caper blue extract and evaluate the toxicity of silver nanoparticles synthesized on the gastric cancer cell line (AGS). In order to synthesize bio-silver nanoparticles, the extract of capers was used. The morphology of bio-silver nanoparticles was evaluated using transient electron microscopy and scanning electron microscopy. The effects of cytotoxicity of biological nanoparticles on two gastric cancer cells (AGS) and normal fibroblast cells (L-929) at concentrations of 3, 5, 12.5, 25, 50 and 100 µg / ml were investigated by MTT colorimetric method during 24 hours. Flow cytometry test was performed to evaluate apoptosis. The IC<sub>50</sub> value of silver nanoparticles was calculated to be 7.79 µg / ml on AGS cell line, which was significant in comparison to the control group (AGS cell, which did not receive nanoparticle treatment). Also, the IC<sub>50</sub> for silver nanoparticles was 12.37 g / ml for normal and non-cellular cells at 24 hours. The induction of apoptosis in AGS cells was more than control compared to control, which was statistically significant. In this study, for the first time, the extract of the capers was used for bioavailability of silver nanoparticles. The results showed that synthesized silver nanoparticles had the effect of cytotoxicity and induced apoptosis on gastric cancer cells.

**Keywords:** Silver nanoparticles, Capers, Gastric cancer, Cell line, Aqueous extract.

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## Anti-inflammatory and Anti-inflammatory Effects of Aqueous Extract of *Tragopogon collinus* and *Taraxacum officinale* Herbs in Rats.

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Unpleasant sensory and emotional experiences are associated with actual tissue damage or damage to another tissue. An emotional pain is common practice such as pinching, finger burning, salt placement in the wound, and hitting the elbow and other possible conditions. Considering the increasing importance of this issue, the aim of this study was to compare the analgesic effect of aqueous extracts of *Tragopogon collinus* and *Taraxacum officinale* herbs with morphine and aspirin as common pain. In this study extracts of medicinal herbs *Tragopogon collinus* and *Taraxacum officinale* were extracted by Macerate method. Male Wistar rats were classified into 7 groups of 9, negative control group (5 ml / kg serum physiology), two positive control groups (one group of morphine 2.5 mg/kg, and another 300 mg / kg), and four treatment groups of doses, 125, 250, 500 and 1000 mg/kg of percutaneous extracts of alkaloids in a single dose. The effect of extract on the first and second phases of the pain was studied using formalin method. The results of this study showed that the analgesic effect of the herbal drug with a dose of 500 on the first phase of pain was more than that of aspirin and less than morphine. The analgesic effect of it in the second phase of pain was not significantly different from that of morphine and aspirin. The results of this study showed that herbal medicine derived from *Tragopogon collinus* and *Taraxacum officinale* herbs is effective in both acute and chronic pain days. Also, since naloxone does not reduce the analgesic effect of herbal medicine in any of the two phases of pain, it can be concluded that the analgesic effect of the drug is not achieved through opioid receptors.

**Keywords:** Aqueous extracts, *Tragopogon collinus*, Morphine, Aspirin, Naloxone, Pain.



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## Chemical Composition of the Essential Oil of *Daphne Stapfii*.

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*Daphne* is a genus including around 95 species of deciduous and evergreen shrubs in the family Thymelaeaceae, native to Asia. They are noted for their scented flowers and often brightly coloured berries. Two species of this genus are used to make paper. Many species are grown in gardens as ornamental plants; the smaller species are often used in rock gardens. All parts of *daphne* are poisonous, especially the berries. *Daphne stapfii* grows in Iran, prov. Kerman and Yazd can reach about 1 m occurs on stony, grassy slopes or in open bush vegetation up to 3000 m altitude, evergreen, winter hardness is given with wetness protection and red fruits [1,2]. This study was targeted to characterize the chemical composition of essential oil of *Daphne stapfii*. The essential oil was analyzed and quantified by gas chromatography and gas chromatography/mass spectrometry. Thirty one compounds were identified, representing 100% of the total oil. Hexadecanoic acid (27.98%), 3-hexane-1-ol, benzoate (17.87%), 1-octadecene (9.01%) were determined as the main constituents in this oil. fatty acid derivatives were dominating in the oil (31.76%) followed by hydrocarbonic compounds (17.21%).

**Keywords:** Essential oil, GC, GC-MS, *Daphne stapfii*

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## The Effect of Preharvest and Postharvest Foliar Sprays of Maleic Hydrazide on Storage Quality of Garlic.

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This study were conducted In order to elucidate the role of maleic hydrazidein increasing storage. Plants were sprayed by malic hydrazidetwo weeks before harvest, and harvested bulbs were held for six months at 10 °C. Garlic of different maturities were sprayed with five concentrations of Maleic hydrazide. preharvest foliar spray of MH in the field, two week befor harvest conducted. The result of variance analysis in the field showed that there were no visible effects on foliage or bulbs from any application of MH. After, bulb were stored at 10 C with relative humidities (RH) of 40% for six months. Analysis of variance before storage revealed no significant differences in characterisation. After harvest at storage conditions, different concentration of MH (0, 517, 1142, 1714 and 2285 ppm) were applied (weight losse, firmness, PH, TSS, organic acid, decay, germination and enzyme) were evaluated. The total weight loss of the stored bulbs decreased with increasing concentration of MH. The weight losses were greatly influenced by the vapor pressure deficits of the storage, and were inversely proportional to the maturity of the bulbs. Increasing concentrations of MH spray resulted in a reduction in sprout development and loss of bulbs weights, firmness, PH, organic acid and decreased TSS, decay, germination and enzyme in stored garlics. Higher specific gravities resulted from zero and 2285 ppm concentrations of MH. It have demonstrated that a preharvest foliar spray of maleic hydrazide induces a striking inhibition of sprouting and greatly reduces storage losses in onions, carrots (Wittwer et al., 1950), and sugar beets.

**Keywords:** Maleic hydrazide, *Allium sativum*, Firmness, Foliar Sprays, Garlic

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**Anti-Methicillin-Resistant *Staphylococcus aureus* Activities of *Lathyrus aphaca* L. and *Vicia narbonensis* L. Plants.**

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In this study, we evaluated the effects of the extracts of the leaves of species from the *Lathyrus aphaca* L. and *Vicia narbonensis* L. plants on a wide and extensive panel of isolated methicillin-resistant *Staphylococcus aureus* strains (MRSA). The effects of the methanolic leaf extracts of the plants on MRSA were evaluated by the disc diffusion assay and the broth dilution method. Among a total of 177 *S. aureus* isolates, 92 (51.97%) were found to be methicillin-resistant in an antibiogram and this was confirmed by the presence of the *mecA* gene in polymerase chain reaction method. All MRSA isolates were sensitive to all extracts. There were dose-dependent inhibitions on tested microorganisms for the plant extracts which showed maximum inhibition zones at a concentration of 300 mg/L. *L. aphaca* had highest antibacterial activity on the MRSA strains compared to the positive control ( $P < 0.05$ ). Minimum inhibitory concentration on MRSA isolates was  $5.5 \pm 0.1$  mg/L, in *L. aphaca*. The methanolic extracts of *L. aphaca* proved to have high antibacterial activity on MRSA isolates, thus representing promising antimicrobial agents in clinical settings.

**Keywords:** Antibiotic resistance, Antibiotic therapy, Nosocomial infections, Medicinal plants

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**Antibacterial Activity of *Anagallis arvensis* L. Extract Against Methicillin-Resistant *Staphylococcus aureus*.**

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*Anagallis arvensis* L. (Scarlet pimpernel) was used to treatment of several ailments in several countries. The aim of this study was to evaluate the *in vitro* antimicrobial activity of leaf methanolic extract of *A. arvensis* against clinical isolates of methicillin-resistant *Staphylococcus aureus* (MRSA). In this study *A. arvensis* leaf was shade dried, powdered and extract was made by using methanol. The antimicrobial activity of methanolic extract was investigated against clinical isolates of MRSA by both the disc diffusion method and the microbroth dilution method. The result of disc diffusion method showed that the plant extract recorded different degrees of antibacterial activity on MRSA as evidenced by the inhibited zones. The MICs of the plant extract and vancomycin were  $>100$  and  $14.5 \pm 0.1$   $\mu\text{g/mL}$ , respectively. This results showed that the plant extract although have slightly effect on MRAS but it was not sufficient strong. *A. arvensis* leaf extract has anti-MRSA properties, corroborating the traditional therapeutic uses of this plant, and can be used in the therapy of infectious diseases as well as an antimicrobial supplement in food industries.

**Keywords:** Scarlet pimpernel, Inhibition zone, Disc diffusion method

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**Antioxidant Activities of *Sonchus asper* L. and *Citrullus colocynthis* L. Schrad. Methanolic Extracts**

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Natural antioxidants have an important role in the many age-related diseases prevention and health promotion. The present study was subjected to screen *in-vitro* antioxidant activity of the methanolic extracts of *Sonchus asper* L. and *Citrullus colocynthis* L. Schrad. The antioxidant activity was estimated by *in-vitro* methods such as: ABTS assay, phosphomolybdic acid method (Total antioxidant activity), 2,2-diphenyl-1-picrylhydrazyl (DPPH) scavenging assay, ferric reducing antioxidant power (FRAP) assay, hydroxyl radical scavenging activity, nitric oxide radical scavenging, Reducing power and total reducing antioxidant potential. According to the results, the extracts of the plants showed significant antioxidant activity in all antioxidant assays when compared to ascorbic acid. The results of this study are encouraging thus indicating the utilization of the *Sonchus asper* and *Citrullus colocynthis* as an important source of natural antioxidants.

**Keywords:** Natural antioxidants, Nitric oxide radical scavenging, Hydroxyl radical scavenging



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### Antibacterial and Antifungal Properties of *Vitis vinifera* L. Methanolic Extracts

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The present study has been concentrated on antifungal and antibacterial properties of *Vitis vinifera* leaves methanolic extract against two fungi (*Candida albicans* and *Aspergillus niger*), two gram-positive bacteria (*Staphylococcus aureus* and *Bacillus subtilis*) and two gram-negative bacteria (*Klebsiella pneumoniae* and *Pseudomonas aeruginosa*). Leaves of grapevine (*Vitis vinifera* L.) were shade dried, powdered and extracts were made by using methanol. The antimicrobial activity of methanolic extract (50, 100, 150, 200, 250, 300, 400 and 500 µg/mL) was evaluated against pathogenic organisms of two fungi (*C. albicans* and *A. niger*), two gram-positive bacteria (*S. aureus* and *B. subtilis*) and two gram-negative bacteria (*K. pneumoniae* and *P. aeruginosa*). The antimicrobial activity was determined by both the disc diffusion method and the microbroth dilution method. Results showed that at 250, 300, 400 and 500 µg/mL of the extract assayed concentrations significantly inhibited the growth of *A. niger* and *C. albicans* ( $P < 0.05$ ). MIC for *A. niger* and *C. albicans* were 75.4 and 80.9 µg/mL of extract, respectively. Results showed that the maximum inhibition zones at concentration of 500 µg/mL on the growth of two Gram-positive bacteria, *S. aureus* and *B. subtilis*. The plant extracts do not significantly inhibit the growth of Gram-negative bacteria, *P. aeruginosa* and *K. pneumoniae* ( $P < 0.05$ ). All bacteria were only marginally inhibited in the disc diffusion assay and showed no activity in the broth dilution assay (MIC > 100 µg/mL). In conclusion, *V. vinifera* extract has antifungal and antibacterial properties, corroborating the traditional therapeutic uses of this plant and can be used in the therapy of infectious diseases as well as an antimicrobial supplement in foods.

**Keywords:** Grapevine, Disc diffusion method, Microbroth dilution method

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### Antibacterial Activities of *Citrullus colocynthis* L. Schrad. Methanolic Extracts

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The emergence of antibiotic resistant strains of bacteria decreases the number of antibiotics available to cure clinical infections caused by these pathogens. In this research our objective was to investigate the antimicrobial activities of methanolic extracts of leaves and fruits of *Citrullus colocynthis*. According to the results, in all the assays, fruit extract exhibited stronger antioxidant activity than that of the leaves. Also, the extracts antibacterial activity was investigated and minimum inhibitory concentration (MIC) values were estimated by broth dilution method. Despite, the extracts prevented the both Gram negative and Gram positive bacteria growth; the MIC values of the leaves methanolic extract were higher than those of the fruit extract. The antibacterial activity of the extracts was found to be certainly correlated with the total flavonoid and phenolic content of the extracts.

**Keywords:** Nitroblue tetrazolium (NBT), Ferric reducing power

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### Effect of Heavy Metals on Seed Germination and Seedling Growth in Some Medicinal Plants.

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This study was conducted to test the effect of heavy metals (Pb, Ni, Cd and Zn) on seed germination and seedling growth in *Amaranthus retroflexus* L., *Cardaria draba* L., *Foeniculum vulgare* Mill. Three replicates of Petri dishes, each containing 50 seeds, were used for each test. For each heavy metal, test solutions were prepared at two concentrations including: the critical concentration in the soil and approximately two times the critical concentration. Distilled water was used as a control. The aim of this research work was to screen studied species for tolerance of heavy metal. The results showed that seedling growth was more affected by different concentration of the heavy metals than seed germination. According to the results, seed germination of *Amaranthus retroflexus* L. was stimulated under zinc (500 and 700 mg/l) and Pb (200 and 500 mg/l) treatments by more than 40 percent in compared with the control. Also the results showed that seedling growth of *Cardaria draba* L. was stimulated under lower concentration of Pb (50 mg/l) and Ni (8 mg/l) by more than 20 percent in compared with the control. *Cardaria draba* L. exhibited tolerance to lead and nickel.

**Keywords:** Seed germination, *Amaranthus retroflexus* L., *Cardaria draba* L.,



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## Phytochemicals Properties in Three Cultivars of Chrysanthemum.

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Herbal plants are being used as medicine from ancient times and useful of them are registered in human history. Herbal plants are reported to be excellent source of several nutrients. Chrysanthemum plants, apart from their ornamental value, are highly aromatic due to the many volatile components of their essential oils, many of which are used in the flavor and fragrance industries. Using secondary metabolites for investigating the variation and classification of the plants have been well determined in a way that these changes can be used in classification of the plants. Chrysanthemums (*Chrysanthemum morifolium* Ramat.) is belongs to the Asteraceae family and one of the most important ornamental plants around the world. In general, this plant is widely used in the floriculture and medical industry and its medical features are determined to be as antibacterial, antiviral, antifungal and anti-inflammatory. Chrysanthemums have a valuable source of secondary metabolites such as phenolic compounds, flavonoids, biological materials and essential oil. Chrysanthemum due to applications numerous that in floriculture and medicinal industries have considered one of the most important ornamental plants and medicinal plants in the global area. Also used as a medicinal plant with strong healing properties in traditional Chinese medicine and considered to treat eye diseases, headaches, colds, and etc. This experiment was carried out in a randomized complete block design with three replications at in the area, Lorestan province. The chemical composition was analyzed by gas chromatography (GC) and gas chromatography/mass spectrometry (GC/MS). The results indicated significant differences among cultivars 'Darya2', 'Mani2' and 'Paridokht' for phytochemical traits. The essential oil content ranged from 0.46 to 0.48 v/w. Analysis of the essential oil revealed the presence  $\alpha$ -Pinene (1.58-2.51%), Chrysanthenone (2.24-2.34%), Trans Chrysanthenyl acetate (2.1-2.82%) as the main components.

**Keywords:** Chrysanthemum,  $\alpha$ -Pinene, Chrysanthenone, GC/MS

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## Investigation of Morphological Traits and Volatile Combinations of Three Medicinal Plants (Lamiaceae Family) in Farm Conditions in Khorramabad

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The term of medicinal plants include a various types of plants used in herbalism and some of these plants have a medicinal activities. These medicinal plants consider as a rich resources of ingredients which can be used in drug development and synthesis. Besides that these plants play a critical role in the development of human cultures around the whole world. In order to obtain knowledge of the behavior of plants in field conditions and changes in essential oils, from the three organs (from Lamiaceae family), the scientific name *Melissa officinalis*, *Mentha piperita* and *Lavandl officinalis* different ecotypes from each medicinal plant were cultured in a randomized complete block design in colleccion medicinal plants the Faculty of Agriculture, Lorestan province. *Melissa officinalis* L. also known as lemon balm, bee balm, honey balm, is a perennial herb belonging to Lamiaceae family. Thirteen morphological characteristics were determined from fresh materials. The chemical composition was analyzed by gas chromatography (GC) and gas chromatography/mass spectrometry (GC/MS). Based on data analysis most of the traits in medicinal plants have significant differences ( $P \leq 0.01$ ). Results showed that the correlation between essential oil content with fresh and dry weight of the branch and also branch height there was a significant and positive correlation. 31 compounds were identified in the essential oil of *Melissa officinalis* (with an average essential oil yield 0.95% of tree replicates), which comprised 90.67% of the total essential oil. The major component was geranial (26.59 %). Other predominant components were Neral (22.93 %) and Eugenol (6.30 %). In the *Mentha piperita* specie 24 compounds were identified 99.19% of total essential oil. Major compounds were Eugenol (45.58%) and Isomenthol (30.49%) with an essential oil content of 0.94%. 53 compounds were identified in the essential oil, representing. 94.14 % of the total oil. The major component was Borneol (15.10 %). Other predominant components were Caryophyllene oxide (7.56 %) and Camphor (6.01 %) with an essential oil content of 0.67%. Products derived from plants may potentially control microbial growth in diverse situations and in the specific case of disease treatment, numerous studies have aimed to describe the chemical composition of these plant antimicrobials and the mechanisms involved in microbial growth inhibition, either separately or associated with conventional antimicrobials.

**Keywords:** *Melissa officinalis*, Essential oil, Geranial, Neral, GC/MS

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## Molecular Study of the Effects of a Medicinal Plant *Vaccinium arctostaphylos* on Inhibiting of the Prostate Cancer Cells Proliferation.

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Antioxidants are widely used as dietary supplements and are preventing targeted in many diseases. *Vaccinium arctostaphylos* is a native plant of northwest Iran with abundant antioxidant compounds including anthocyanin, flavonoid and alkaloids that have preventing potential of cancers such as prostate cancer. This antioxidants prevent oxidative degradation of DNA by active oxygen species. The aim of this study was measuring the *Vaccinium arctostaphylos* poly phenols and anthocyanin effects on PC-3 cell line and GST methylation and expression variations. *Vaccinium arctostaphylos* extraction for survival potency investigation has treated in CRD template cultivated PC-3 cell line in 4500, 2250, 1125, 562/5, 140/62, 70/31, 35/15, 17/57, 8/78, 4/39 µg/ml concentrations for 24, 48 and 72 hours, as 3 treat were repeated. GSTP1 gene expression has analyzed by Q-RT-PCR in 2500, 1250, 625, 312, 156 µg/ml *Vaccinium* concentrations. Statistical results showed that 35-70ppm *Vaccinium arctostaphylos* poly phenolic extract has significantly reduced PC-3 cells survival rate. Moreover comparing to control cells, GST gene expression has significantly increased in PC-3 cells that were treated with 1250ppm extraction. Anthocyanin- polyphenolic extract from the *Vaccinium arctostaphylos* can decrease cancerous cells survival and GST gene expression in human prostate cancer PC-3 cells. This may be explained by cells carcinogenesis pathway or CpG demethylation process.

**Keywords:** *Vaccinium arctostaphylos*, Antioxidant, Cancerous cells, Prostate.

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## Healing Effect of Hydroalcoholic Olive Leaf Extract Ointment in 3<sup>rd</sup> Degree Burn in Rat.

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There are various kinds of wounds, the most important of which are burn wounds due to their susceptibility to infections because of vascular necrotic tissue. Burn healing has remained challenging in modern medicine and there are a few drugs capable of accelerating wound healing. Toxicity is one of the most restrictions that prevents using compounds with promising activities against collagen synthesis or fibroblast proliferation. Regarding this, plants are rich sources that can be taken advantage of. Thanks to moderate efficacy, none or less toxicity, low cost and more availability of herbal products are one of the best alternatives to survey. There are several reports in literature using herbal drugs to heal burn injuries. 36 male Wistar rats weighing 180 to 200grams were divided into 3 groups of control, olive leaf ointment and silver sulfadiazine ointment and housed under standard conditions. The combination of ketamine (70mg/kg) and xylazine (5mg/kg) were used for anesthesia then the hair of the back of animal's were shaved and after disinfection and drying a rectangular copper in dimensions of 1.5 × 1 cm set in 94°C water for 20 minutes then placed on the back of animal for 30 seconds for creation of standard grade 3 burn. To confirm the grade 3 burn, a sample is immediately taken and referred to the pathology lab. Rats in treatment groups received Olive leaf ointment, silver sulfadiazine ointment and control group just received distilled water. The wounds were treated twice a day with an interval of 12 hour and treated for 21 days. In order to quantify the rate of wound healing, the size of lesions were determined at 4, 7, 14 and 21 days after burn injury, also the animals were sacrificed with an overdose of anesthetics, the burn areas were removed and fixed in formalin. Tissue sections were prepared and stained with hematoxylin and eosin (H & E). The sections were examined under light microscope and photographed. Contraction of wound in olive leaf ointment group was significantly higher when compared with control group in 4, 7, 14, 21 days after wound creation (P<0.05). Contraction of wound in silver sulfadiazine ointment group was significantly higher than control group (P<0.05). Silver sulfadiazine ointment significantly was more effective when compared with olive leaf ointment (P<0.05). We demonstrated that wound closure was significantly shortened when the wounds were treated with olive leaf ointment compared to control group.

**Keywords:** Olive, Burn, Ointment, Wound, Rat

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## Wound Healing Effects of Olive Leaf Ointment Compared to DaruDarman Co. Derma Heal Ointment in Streptozotocin-Induced Diabetic Rats.

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Diabetic ulcers, one of the most common prevalent complications in diabetic patients, are becoming a serious concern worldwide. According to the International Diabetes Federation, There are 425 million people with diabetes in the World. There will be 629 million people with diabetes in the World in 2045. Wound healing in diabetes is primarily, associated with hyperglycemia, over-expression of inflammatory cytokines, oxidative stress, delayed collagen synthesis, reduced angiogenesis and also the microbial infections. Plant extracts with wound-healing properties have the potential for antioxidant, chelation, and antimicrobial activities and may act by one or more of these mechanisms. 36 male Wistar Rat weighing 180-220 g were divided into 3 groups of control, olive leaf ointment and derma heal ointment. In this experimental study, olive leaf extract Ointment 10% (Eucerin based) was provided by Razi Herbal Medicine Institute, Lorestan, Iran. Diabetes was induced by a single intraperitoneal injection of streptozotocin (65mg/ kg) in 0.1 M citrate buffer, pH 5.0. after 3 days, fasting blood glucose was measured using enzymatic oxidation method by a glucometer. Rats with blood glucose levels higher than 250 mg/dl were considered diabetic. Under ether anesthesia, the hairs on the back of all groups were shaved and a 1 cm long full-thickness incision was made. Animals in treatment groups treated with ointments and control group only received Eucerin Once a day for a total period of 14 days. The rate of wound contraction was expressed as percent contraction of the area of open wound. Two rats from each group was sacrificed and skin samples were prepared for histopathologic examination on days 3, 7, 14. On the 21th post-wounding day all animals were sacrificed. The isolated tissues were fixed in 10% formalin. It was dehydrated through graded alcohol series, cleared in xylene and embedded in paraffin wax (melting point, 56°C). Serial sections of 5 µm were cut, and stained with haematoxylin and eosin (H&E) stain. The sections were examined under light microscope and photographed. Contraction of wound in olive leaf ointment group was significantly higher when compared with control group in 3,7,14,21 days after wound creation (P=0). Contraction of wound in derma heal ointment group was significantly higher than control group (P=0). Derma heal ointment significantly was more effective when compared with olive leaf ointment. we demonstrated that wound closure was significantly shortened when the wounds of diabetic rats were treated with olive leaf ointment compared to control group.

**Keywords:** Diabetes, Wound, Olive, Streptozotocin, Rat

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## Effects of Nitrogen form and Concentration on Agromorphological and Essential Oil of Peppermint (*Mentha piperita* L.).

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Considering the pronounced effects of nitrogen on growth and different attributes of plants, nitrogen nutrition is considered as one of the most important production management strategies. The present study was conducted to investigate the effects of nitrogen form and concentration on agromorphological and essential oil of peppermint (*Mentha piperita* L.) in hydroponics. Treatments were set up in a factorial arrangement with two factor including nitrogen concentration (5 and 10 mM) and form (0:100, 25:75, 50:50, 75:25 and 100:0 nitrate to ammonium) based on the randomized complete block design with three replications. According to the results, nitrogen form has significant effects on various characters of the plant including aerial parts and root fresh and dry weights, root volume, leaf to stem and aerial parts ratios, stem number and oil yield. Plants grown in nutrient solution containing 50:50 nitrate to ammonium ratio exhibited the highest fresh and dry weights of the aerial parts (85.44 and 13.26 g, respectively) and root (69.55 and 15.78 g, respectively). Plants grown in nutrient solutions containing various levels of ammonium had the higher leaf to stem and aerial parts ratios than those grown in nitrate alone. Also, interactions of nitrogen form and concentration on the oil yield were significant. In general, application of ammonium led to the better growth of the plant.

**Keywords:** Peppermint, Ammonium, Hydroponics, Nitrate, Nitrogen

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## Effect of NaCl Induced Salinity Stress on Different Ecotypes of *Camphorosma monspeliaca* in Experimental Conditions.

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Salinization of soils or water is one of the world's most serious environmental problems in agriculture. It is necessary to determine the environmental factors under which medicinal and aromatic plants give higher yields and better quality [1]. In this research, seeds of *Camphorosma monspeliaca* were collected from natural habitats in 2017. This experiment was conducted factorially based on randomized completely block design (RCBD) with three replications. The first factor was seeds from three habitats (ecotype), including Shahre-kord province (un-saline habitat), Hamadan province (habitat with moderate salinity) and Arak province (saline habitat) and the second factor was different levels of NaCl induced salinity stress including S1 (0 mM), S2 (100 mM), S3 (200 mM), S4 (300 mM), S5 (400 mM) and S6 (500 mM). After disinfection, seeds were sowed in controlled environment. The results showed that between ecotypes and salinity treatments in regard to some parameters for instance plant height, root length, soluble solid, free proline, total chlorophyll and magnesium concentration, significant differences were existed at 1%. Maximum plant height (37.55 cm), root length (50.57 cm), shoot weight (52.27 gr/bush), root weight (57.18 gr/bush), total chlorophyll (24.1 mg/g FW) and sodium concentration (48.10 mg/L), was related to Arak ecotype. Minimum plant height (33.56 cm), root length (43.48 cm), shoot weight (18.07 gr/bush), root weight (12.2 gr/bush) and Maximum sodium concentration (13.58 mg/L) and magnesium concentration (9.03 mg/L) was related to S6 (500 mM) treatment. Maximum soluble solids (0.92 mg/L) and free proline (0.73 mg/L) was seen in S6 (500 mM). Correlation between shoot weight and root weight ( $r = 0.8^{**}$ ) and total chlorophyll ( $r=0.81^{**}$ ) were positive and significant. These results indicated that *Camphorosma monspeliaca* was salt-tolerant bushy plant and in order to develop cultivation, further research and practicable activity was require.

**Keywords:** *Camphorosma monspeliaca*, Salinity, Proline, Salt-tolerant, Natural habitat

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## Comparison of Vegetative and Physiological Characteristics of Different Ecotypes of *Artemisia sieberi*.

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In this research, aerial parts of *Artemisia sieberi* during vegetative growth stage were collected from three natural habitats. Habitats (ecotype) were included Karaj province (Eshtehard region), Tehran province (Varamin region) and Qom province (Hose-soltan lake area). The results indicated that between ecotypes in regard to some parameters for instance plant height, shoot weight, root length, root weight, tiller number, soluble solid content, free proline and total chlorophyll, significant differences were existed. Maximum plant height (29.68 cm) was related to Qom ecotype and minimum (22.09 cm) was related to Tehran ecotype. Maximum (40.44 gr/plant) and minimum (29.52 gr/plant) shoot weight were related to Qom and Karaj, respectively. Maximum root length (16.8 cm) was related to Qom ecotype and minimum (11.66 cm) was related to Karaj ecotype. Maximum tiller number (3.72) and minimum (2.44) were related to Qom and Karaj, respectively. Maximum root weights were observed in Karaj (12.47) and minimum in Tehran (11.6) ecotypes. Karaj ecotype had a maximum soluble solid content (0.74 mg/L) and Qom ecotype had a minimum (0.57 mg/L). Maximum free proline in Tehran ecotype (0.67 mg/L) and minimum in Karaj ecotype (0.45 mg/L) were seen. Maximum total chlorophyll was related to Qom ecotype (1.2 mg/L) and minimum was related to Tehran ecotype (0.96 mg/L). These results imply that, Qom ecotype was most suitable between ecotypes.

**Keywords:** *Artemisia sieberi*, Medicinal plant, Ecotype, Proline, Natural habitat



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## Antibacterial Potential of Indigenous Probiotic Bacteria and Herbal Extracts Against Pathogenic Bacteria.

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Owing to the emergence of antibiotic resistance and the posed risks and health dangers related to the unsafe use of antibiotics, a number of alternatives to these drugs have been investigated. Among these alternatives, probiotic bacteria and herbal extracts are of high significance. In this research we aimed to investigate the antibacterial potential of our locally isolated probiotic bacteria and herbal extracts including Chamomile (*Matricaria chamomilla*), Fennel (*Foeniculum vulgare*), Peppermint (*Mentha × piperita*) and thyme (*thymus vulgaris*), against several medically important bacterial pathogens. *Lactobacillus casei*, *L. plantarum*, *L. reuteri*, *Enterococcus faecium*, and *Pediococcus acidilactici* isolated from poultry intestinal specimens, mothers milk and dairy products were evaluated for their probiotic potential. The antibacterial effect of the mentioned isolates and the herbal extracts were explored against *Salmonella typhimurium*, *S. enteritidis*, *Staphylococcus aureus*, *E. coli* K99, *Streptococcus agalacticae*, *Listeria monocytogenes* and *Pseudomonas aeruginosa* by agar well diffusion method. The synergistic effect of probiotic bacteria and the herbal extracts in different doses against the pathogens by agar well diffusion assay was studied. The viability of probiotic bacteria in the presence of different concentrations of herbal extracts were determined after 24, 48 and 72 hours. The two-fold serial-dilution microtitre plate method using p-iodonitrotetrazolium (INT) violet as an indicator of microbial growth, was used to determine the MICs of the probiotic bacteria in the presence of herbs. The MIC value was recorded as the lowest concentration of extract that inhibits growth of test organisms. All experiments were performed in triplicate and results analyzed statistically. According to the results, *L. plantarum* and *Enterococcus faecium* demonstrated maximum inhibitory actions towards the tested pathogens. While, thyme and peppermint showed active antibacterial agents. The selected probiotic bacteria and extracts showed synergistic effects and increased inhibitory activity was seen when the two were combined. To conclude, probiotic bacteria and herbal extracts are strong antibacterial agents that might be suitable alternatives to antibiotics for treatment of infectious diseases in future.

**Keywords:** Probiotic bacteria, Herbal extracts, Bacterial pathogens, Antibacterial activity

### References

[1] Isolation and identification of probiotic *L. plantarum* strains isolated from goats milk and antimicrobial evaluations against pathogenic bacteria

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## The Study of the Effect of Shilajit Methanolic Extract on Differentiation of Human Mesenchymal Cells in to Osteoblast.

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Shilajit is the substance is black-brown in color, is found in openings and fractures adjacent to the underground oil reserves and the height of the mountains. traditionally it has been used to treat fractures. In the present study, we investigated the effect of Shilajit methanolic extract on mesenchymal stem cells and their differentiation into osteoblast. Mesenchymal stem cell, supporting hematopoietic stem cells in bone marrow, can regenerate tissues such as bone, cartilage, muscle, tendon and fatty tissue. In this experimental study, bone marrow cells were prepared from Pasteur Institute and were treated with 100 and 200 µm concentration of Shilajit. cytotoxicity of Shilajit extract was measured by MTT assay (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide). Differentiation effects were investigated by alizarin red staining after 21 days and alkaline phosphates (ALP) activity after 14 days. The results showed after 24 hours, cell proliferation was significantly increased and did not have any toxic effects on the cells. alkaline phosphatase activity was more than control in the treatment, indicating the onset of differentiation in the cells. alizarin red staining showed Shilajit extract increased osteogenic differentiation. according to the findings of this study, used of Shilajit extract effectively enhance BMSCs differentiation.

**Keywords:** Mesenchymal stem cells, Osteoblast, Shilajit, Differentiation

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## Traditional Use of Medicinal Plants Species in Darkhatoon-Absorkh Distric, Lorestan, Iran.

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The Darkhatoon-Absorkh (10,938 hectares) Located in the south-east of Khorramabad city, Lorestan province, with Geographic situation E 48° 30' and N 33° 13'. The main aims of this research were introduce medicinal plants, habitat, and local name, native and local medicinal herbs with conventional ethnobotanic method in Darkhatoon-Absorkh district. Based on the results, 102 species were recognized as medicinal and edible plant. The largest plant organ used among the species identified were: leaf (32 species), root, tubers and rhizomes (31 species) fruit (24 species), flowers (18 species), seeds (17 species), latex (17 species) flowering branches (12 species), shoots (12 species), gum and resin wood (2 species) and all parts of 2 species. Most uses of medicinal plant in the field ethnobotanical includes gastrointestinal problem (40%), urinary tract infections (24%), respiratory (12%), dental problems (7%) and hyperglycemia (5%), were observed.

**Keywords:** Darkhatoon-Absorkh (Wark), Ethnobotany, Lorestan, Medicinal plant

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## Traditional and Indigenous Uses of Medicinal plants by Local Residents in Malavi District, Lorestan Province, Iran.

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The aim of this study was to investigate the traditional use of medicinal plants of the indigenous peoples in Malavi district (Lorestan province). Data were collected by using indigenous and elderly people's information about the use of medicinal plants. There are 140 medicinal or edible plant species which belong to 48 plant family. The results showed that the Asteraceae (Compositae) family with 26 species of medicinal plants, Fabaceae with 14 species, Apiaceae (Umbelliferae) with 11 species and Lamiaceae with 10 species was the most widely used drugs. The most commonly used medicinal identified plants in the Malavi region were observed for the treatment of gastrointestinal diseases, respiratory system, urinary tract, lipid and hypertension, treatment and healing of scars, allergies, dermatologic disorders and disinfectants.

**Keywords:** Ethnobotany, Lorestan, Medicinal plant, Malavi.

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## Ginger Essential Oil Incorporated with Citric Acid and Cellulose Nanofibers: an Edible Coating to Extend the Shelf Life of a Ready-to-Cook Barbecued Chicken.

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According to consumers' request for use less synthetic preservatives, extensive research has been done to investigate the antimicrobial effects of plant essential oils. Chicken meat is highly sensitive to spoilage and food borne disease due to contamination during the slaughter, processing and transferring. The use of natural preservatives such as essential oils in combination with biodegradable polymers is expanding to extend shelf life of food. This study was aimed to investigate the antimicrobial and antioxidant effects of cellulose nanofibres (CNF) coating incorporated with Ginger essential oil (GEO) and Citric acid (CA) in ready to cook barbecued chicken under refrigerated conditions. The essential oil was extracted by water distillation method (using Clevenger's apparatus) and analyzed by GC-MS. The treatments were prepared with adding the desirable concentrations of GEO (1, 2%) in combination with CA (1%) and a solution of CNF (0.1%). Then, the treatment solutions was added to barbecued chicken meat (containing onion, salt, pepper, saffron) and were kept in sterile plastic bags at 4 ° C and analyzed on days 2, 4, 6, 8 and 10 of storage. The microbial analyses were included count of psychotropic bacteria, mesophilic bacteria, pseudomonas spp., enterobacteriaceae, molds and yeasts and chemical tests including peroxide index measurement and sensorial test. All treatments significantly decreased the population of mesophilic bacteria, pseudomonas spp., enterobacteriaceae, Psychotropic bacteria and molds-yeasts in comparison with the control group and CNF group (P<0.05). The complex of GEO (2%)-CNF (0.1%)-CA (1%) was the most effective treatment to extend the shelf life of barbecued chicken. The peroxide value, pH and thiobarbituric acid significantly were lower in comparison to the control group (P <0.05). Sensory evaluation indicated that ginger had a pleasant effect on most sensory characteristics of chicken meat (taste, odor, texture and Overall). It could be concluded that GEO with CNF coating be introduced as a substitute for preservatives as well as for chemical flavors in chicken meat in refrigerated conditions.

**Keywords:** Ginger essential oil, Cellulose nanofibers, Citric acid, Barbecued chicken

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## Effects of Aqueous Extract *Saponaria officinalis* on Diabetic Indices and Cardiac Complications in Type 1 Diabetic Rats.

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*Saponaria officinalis* is a common perennial plant from the carnation family (Caryophyllaceae). *Saponaria officinalis* are the active ingredients that found in herbal remedies for ameliorate the variety of disorders. *Saponaria officinalis* has an antioxidant, anti-inflammatory and anti-tumor. This study was conducted to evaluate the possible antidiabetic and cardioprotective effects of *Saponaria officinalis*. The animals were made diabetic using streptozotocin (60 mg/kg, i.p.). Rats were divided into four groups that treated with vehicle or *Saponaria officinalis* at doses 5, 10 or 25 mg/kg. All treatments were administered orally for 4 weeks. At the end of experiment the blood samples were collected for determine FBS, HbA1c, insulin, triglyceride, cholesterol and HDL. After 72 h, animals anesthetized, hearts were removed quickly and mounted on Langendorff apparatus. The max pressure, heart rate, max dP/dt, contractility index and coronary flow were measured. Chronic administration of *Saponaria officinalis* exhibited a significant reduction in fasting serum glucose, triglycerides, total cholesterol, HbA1c and increased level of plasma insulin and HDL in diabetic rats ( $P < 0.05$ ). *Saponaria officinalis* could significantly increased hemodynamic indices such as max pressure, max dP/dt, contractility and coronary flow ( $P < 0.05$ ). *Saponaria officinalis* improved diabetes through decreasing blood glucose, lipid profile, HbA1c. Increased insulin secretion can be a mechanism for antidiabetic effect of *Saponaria officinalis*. Regarding the antidiabetic and cardioprotective effects of *Saponaria officinalis*, it can be concluded that this *Saponaria officinalis* compound can be potentially used to reduce diabetes and its cardiovascular complications.

**Keywords:** Type 1 diabetes, *Saponaria officinalis*, Isolated hearts system (Langendorff)

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## The Effect of Sumac Water Extract Incorporated with Edible Coating Gelatin/chitosan Nanofibers on the Characteristics of Microbial, Chemical and Sensory Sheep Meat during Refrigerated Storage.

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The tendency to use the derivatives and extracts of traditional medicine herbs has extensively grown in the food industries. This could be due to society concerns about the harmfulness of chemical preservatives to increase food shelf life. Considering the nutritional and biological composition of red meat even in refrigerator temperature, this product is susceptible to microbial and chemical decay. This study was aimed to evaluate effects of sumac water extract (SWE) as an antimicrobial and antioxidant agent in combination with edible coating gelatin (G)/chitosan nanofibers (CNF) on the characteristics of microbial, chemical and sensory sheep meat during refrigerated storage. The extract was obtained by maceration of dried sumac fruit in sterile water. The optimal organoleptic concentrations of SWE were added to the combination of CNF and gelatin at different concentrations. The microbial, chemical and sensory properties were evaluated on the treatments including control, G (4%)/CNF (1.5%), G/CNF/SWE 1.5%, G/CNF/SWE 3%, G (4%), CNF (1.5%), SWE 1.5%, and SWE 3% in 6 intervals on days 3, 6, 9, 12, 15 of storage at 4 °C [2]. The Microbial tests were included count of mesophilic bacteria, psychrotrophic bacteria, pseudomonas spp., enterobacteriaceae, molds and yeasts, lactic acid bacteria and as well as chemical tests were conducted such as measuring of peroxide value, pH, thiobarbituric acid and sensory tests. The edible coatings containing SWE (1%) in combination with the composite of G (4%)/CNF (1.5%) significantly ( $P < 0.05$ ) reduced the microbial population and the lipid oxidation during storage sheep meat. The most antimicrobial activity in the treatments was observed on enterobacteriaceae to reduce 3/77 log cfu/g compared with the control group. In addition, treatments containing SWE were resulted in a significantly reduction in amount of thiobarbituric acid about 70%. Finally, SWE can possibly extend the shelf life and acceptability of sheep meat.

**Keywords:** Sumac water extract, Edible coating, Chitosan Nanofibers, Gelatin

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## Studying the Analgesic Effects of Ziziphora tenuifolia L. in Mature Little Male Lab Rats.

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Ziziphora is one of the traditional herbal medicines. Pulegone is one of the main and active chemical compounds of ziziphora with great analgesic and anti-inflaming effects. Therefore, the purpose of this research is to study the analgesic effects of ziziphora in Sirjan (paariz) in mature male lab rats. In this research, after collecting ziziphora leaves and its young branches in Sirjan, extraction was performed using soaking method. Its analgesic activity was also evaluated with formalin test. Of the six selected rat groups, hydro-alcoholic extract was intraperitoneally injected in 50, 100, 150 Mg/Kg. The control group received no treatment and the non-controlled group, intraperitoneally received the drug solvent that is, physiological serum. The group has also received morphine in 10 Mg/Kg. Then, the data was collected and it was analyzed using SPSS 17 and one-way variance analysis at a meaningful level of  $p < 0.05$ . The result of this study indicated that intraperitoneally injecting Ziziphora of Sirjan in 50, 100, 150 Mg/kg reduces the primary and secondary phases of formalin-induced pain in male rats. The data showed that this herbal medicine (ziziphora) has analgesic effects on small lab rats and this plant has to be considered in future treatments and it could be a good alternative for chemical drugs.

**Keywords:** Ziziphora, Pain, Formalin Test, Lab Rats

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## Studying the Effect of Lawsonia Inermis Extract in Wound Reparation on Mature Male Lab Mice.

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One of the well-known herbal drugs is henna (*Lawsonia inermis*). According to the components in henna, several beneficial properties (antimicrobial, anti-inflammation, wound healing and antioxidant) have been reported. The present study was designed to investigate the effects of *Lawsonia inermis* extract in wound reparation on mature male lab mice. In this project, after collecting leaves of *Lawsonia inermis* from Larestan region and dried by added 200 g of powdered plant, to 1000 ml of alcohol 70% and extract was prepared. For study 45 mice with a weight range of 190-210 g were used. Mice were divided into three groups of 15, called control, treatment and witness group. In all three groups, 3 cm in length scarring were created on the skin of the lumbar spine. Measurement of scarrings were taken every day and they were compared all treatments days with one way ANOVA test with spss software version 20 with each other in percent and area. For histological studies, on the third, sixth, ninth, fifteenth and twentieth days of each group, samples of total thickness of the wound were removed. Results revealed that in treatment group compared to control group, significant increase was seen in wound closure, hair follicle numbers, and blood vessel numbers. Also increased skin thickness and diameter of collagen fibers was seen. These findings showed the acceleration of wound healing in the treated samples. Effect of the extract on accelerating the transition from inflammatory to fibroblasts hyperplasia phase maybe due to an increase in synthesis of collagen and blood vessels which occurs in this stage.

**Keywords:** *Lawsonia inermis*, Wound, Reparation, Mice

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## Evaluation of Antifungal Activity of Grape Seeds Extract and its Phenolic Compounds Against Dermatophyte.

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Dermatophyte fungi are the main agents of skin diseases of man and, some of which cause well defined infections: dermatophytoses (tinea or ringworm). They possess two important properties: they are keratinophilic and keratinolytic. Usage of medicinal plants by human have been known for centuries and therapeutic efficacy of several herbal species has been widely described. The exploitation of natural products of plant origin might be an alternative for chemical drugs, as plant extracts have been shown to contain a wide variety of antifungal compounds. In this study, an evaluation of the antifungal activity of grape seeds from *Vitis vinifera* L. against dermatophytes was performed. *Vitis vinifera* is known for its health benefits because of its high content of phenolic compounds. We performed a study with search the following electronic databases such as MEDLINE and EMBASE databases with use of keywords such as Dermatophyte, anti fungal, grape seeds extract and phenolic compounds in search engine such as sciencedirect, pubmed to identify reports of relevant published from 2000 through 2018. A selection of relevant English-language, clinical trials, systematic reviews, and meta-analyses within the last 18 years were performed. Recently, the study demonstrated that extracts by *Vitis vinifera* seeds obtained from mature grapes, rich in polymeric flavan-3-ols, exhibit good antifungal activity against *Candida* species, dermatophytes and *Malassezia* species, suggesting their use in mucocutaneous fungal infections, others' in-vitro data indicate that a polyphenolic compound such as epigallocatechin gallate (EGCG) has anticandidal activity and EGCG causes inhibition of *C. albicans* growth. In fact, the grape seed contains many types of polyphenols, for example procyanidins, a group of polyphenols, which induces the Th1-derived gamma interferon. IFN-gamma is known to have killing activity of *C. albicans*. In addition to the antifungal activity by direct interaction to the candidal cells, it would be presumable that such immunologic induction by such polyphenols in the extract of grape seeds might help mice resist against the disseminated disease. Furthermore, grape extracts contain large quantities of monomeric phenolic compounds such as (+)-catechins, (-)-epicatechin and (-)-epicatechin-3-o-gallate, and dimeric, trimeric and tetrameric procyanidins. In conclusion, the results of the present study demonstrate that extracts obtained from grape seeds show antifungal activity against dermatophytes. These extracts, could be used as antifungal agents in many fields. However, efforts are also needed to formulate the final product and offering a unique opportunity to develop an innovative antifungal product.

**Keywords:** Dermatophyte, Anti Fungal, Grape Seeds Extract, Phenolic Compounds.

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## Assessment Antidiabetic Effects of *Ziziphus mauritiana*

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Diabetes mellitus (DM) is a group of metabolic disorder and it is characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The worldwide prevalence of diabetes mellitus is estimated to be 2.8%. The excess of morbidity and mortality associated with DM and its complications emphasize the importance of new or alternative therapeutic strategies in prevention and treatment of this chronic disorder. *Ziziphus mauritiana* (ZM) having tremendous medicinal properties, attributed by a diverse group of secondary metabolites. This study was carried out by searching studies in PubMed, Google Scholar, Sciencedirect, by using the search terms "*Ziziphus mauritiana*," "hyperglycemic," "antidiabetic activity". The search was completed through October 2017. In this review, 45 articles that are associated with effects and antihyperglycemic effect of *Ziziphus mauritiana*, were found and of these, 19 articles were applied. Various extracts, petroleum ether, chloroform, aqueous, and crude aqueous, of fruits of *Ziziphus mauritiana* and the fractions of petroleum ether and aqueous extracts were tested for antihyperglycemic activity in glucose overloaded hyperglycemic rats. Comparatively, the non-polysaccharide fraction of the aqueous extract was found to be more effective, followed by the aqueous extract, and the petroleum ether extract. Hypoglycemic effect of seed extract of *Ziziphus mauritiana* in alloxan-induced diabetic mice was assessed and administration of the extract reduced the weight loss and mortality rate. These results suggest that the extract possesses synergistic hypoglycemic activity. Studies show that seed, leaves and root extract of *Ziziphus mauritiana* with different mechanisms have hypoglycemic and antihyperglycemic effects. Researches supports the inclusion of this plant in traditional antidiabetic preparations, and the formulations made using the identified effective extract and fraction of this plant could serve the purpose better than the existing formulations with crude aqueous extract.

**Keywords:** *Ziziphus mauritiana*, Hyperglycemia, Antidiabetic activity

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**Germination and Growth Response of Pea, Safflower and Wheat to Allelopathic Effect of Achillea (*Achillea santolina*).**

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Allelopathy arises from the release of chemicals by one plant species that affect other species in its vicinity, usually to their detriment. Defense agents, allelochemicals or allelopathins, are largely classified as secondary plant metabolites that play an important role in allelopathic interactions or plant defense and act as important ecological mechanisms [1]. In order to investigate the likely allelopathic potential of an aqueous extract and powder of Achillea (*Achillea santolina*) on the germination and seedling growth of pea (*Cicer arietinum*), safflower (*Carthamus tinctorius* L.) and wheat (*Triticum sativum*), an experiment was carried out at the laboratory and greenhouse of agriculture faculty of Shahid Bahonar University of Kerman, Iran. A completely randomized design with three replicates using five extract concentrations of achillea plant including 0, 25, 50, 75, and 100 g l<sup>-1</sup> of soil was employed in laboratory and greenhouse experiments, respectively. All extract concentrations of achillea except 25 g l<sup>-1</sup> and four amounts of powder of it including 0, 7.5, 15 and 30 g kg<sup>-1</sup> inhibited pea and wheat seed germination significantly, but had no inhibitory effect on the germination of safflower. The powder of mature achillea plants affected the fresh and dry weight and shoots length in these crops negatively compared with the control in all levels. A number of studies have suggested that plant residues (especially weed species) affect the growth and development of other plants including crops by releasing allelochemicals into the immediate soil environment [2]. The present bioassays were conducted under laboratory and realistic soil conditions indicate the presence of some water soluble phytotoxins in achillea that leach from the debris into the water. Therefore, achillea must be considered as an allelopathic species posing risk in a rotation or an intercropping with pea, wheat and safflower. With the aim of alleviating its adverse effects on intercropping or subsequent crops, farmers should remove residues of achillea from the agricultural land.

**Key word:** *Achillea santolina*, Allelopathy, Germination, Pea, Safflower, Wheat

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**Evaluation of Allelopathic Effect of Lemon Balm on Seedling of Some Common Crops.**

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The effects of allelopathy on germination and growth of plants may occur through a variety of mechanisms including reduced mitotic activity in roots and hypocotyls, suppressed hormone activity, reduced rate of ion uptake, inhibited photosynthesis, respiration and protein formation, decreasing permeability of cell membranes and/or inhibition of enzyme action. In order to investigate the likely allelopathic potential of an aqueous extract and powder of lemon balm (*Melissa officinalis*) on the germination and seedling growth of pea (*Cicer arietinum*), safflower (*Carthamus tinctorius* L.) and wheat (*Triticum sativum*), an experiment was carried out at the laboratory and greenhouse of agriculture faculty of Shahid Bahonar University of Kerman, Iran. A completely randomized design with three replicates using five extract concentrations of lemon balm plant including 0, 25, 50, 75, and 100 g L<sup>-1</sup> and four amounts of lemon balm powder including 0, 7.5, 15 and 30 g kg<sup>-1</sup> of soil was employed in laboratory and greenhouse experiments respectively. All extract concentrations of lemon balm except 25 g l<sup>-1</sup> inhibited pea and wheat seed germination significantly, but had no inhibitory effect on germination of safflower. The powder of mature lemon balm plants affected the fresh and dry weight and shoots elongation in these crops negatively compared with the control in all levels. Some of studies have suggested that plant residues (especially weed species) affect the growth and development of other plants including crops by releasing allelochemicals into the immediate soil environment [2]. The adverse effects of phytotoxins from plant residues on the seedling growth of succeeding crops reported. Therefore use of this plant should be prevented in rotation or intercropping with these three crop plants. Further research conducted in the analytical laboratory as well as in the field is needed before a practical application of the extract and powder as weed inhibiting agent can be recommended.

**Keywords:** Allelopathy, Lemon balm, Germination, Growth, Pea, Safflower, Wheat

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## Hormonal Priming with Salicylic Acid Alleviated Salinity Stress in Isabgol (*Plantago ovata*).

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Salinity affects 19.5% of irrigated and 2.1% of dry land agriculture across the globe. Seed germination has long been of interest to plant ecologists due to its vital role in plant establishment. Germination is a crucial stage in the life cycle of plants and tends to be highly unpredictable over space and time. Successful establishment of plants largely depends on successful germination. To investigate the effects of salicylic acid on germination, germination rate, seed stamina index, shoot length, root length, seedling fresh and dry weight of Isabgol (*plantago ovata*) under salinity stress a factorial experiment based on completely randomized design with three replicates was carried out at the laboratory of agriculture faculty of Shahid Bahonar University of Kerman, Iran. The experimental treatments were a combination of five salinity levels (0, -2, -4, -6 and -8 bar NaCl) and three salicylic acid levels (0, 0.25 and 0.5 mM). The means of all traits decreased with increasing in salinity concentration but using salicylic acid lessened the effect of salinity on measured traits. The effect of highest level of salicylic acid on measured traits was more pronounced compared with the other two levels. Previous studies demonstrated that SA or related compounds could be used as effective preventive compounds against oxidative damage in plants. oHCA is also able to quench singlet molecular oxygen, and although there is as yet no proof that it serves as a direct precursor of SA in pea plants, its increased level in SA-treated plants indicates that the pathway leading to SA synthesis is activated in SA-treated (i.e. seed-soaked) pea plants. Based on the results SA as a phytohormone play critical roles in plant responses to salinity and it can be concluded that hormonal priming with salicylic acid increase the ability of isabgol to grow successfully under saline conditions. Finally, in future, this hormonal priming treatment may be used for improving plant growth and yield in saline areas.

**Keyword:** Isabgol, Germination, Salicylic Acid, Salinity Stress.

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## Investigating the Habitat of *Citrullus colocynthis* in the Boshroyeh Region.

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The Cucurbitaceae family is one of the most genetically diverse groups of food plants (Zaini *et al.*, 2011). *Citrullus colocynthis* Schrad. (Cucurbitaceae) fruits are usually recognized for its wide range of medicinal uses as well as pharmaceutical and nutraceutical potential. Fruits of *C. colocynthis* are traditionally used as antidiabetic medication in Middle East countries like Iran (Nmila *et al.*, 2000). Therefore, this plant is valuable and can be used to generate income. One of the ways to produce crops from this plant is to expand its cultivation area. Since the plant grows naturally in the wilderness, it is necessary to examine its habitat. In this research, the habitat of *C. colocynthis* was studied in Boshroyeh region (South Khorasan). Plant density was evaluated by using of 1 m<sup>2</sup> plots. The soil samples were taken from 0-60 cm (depth of Roots). All soil samples were analyzed according to Carter (1993) in soil and water laboratory of International Desert Research Center (University of Tehran) Based on the results, the climate is hot and dry and the average precipitation is 99 mm in plant habitat. This plant is more often seen with saxual tree (*Haloxylon aphyllum*) trees under the story of the arid forest. Its habitat with the salinity of 3 to 10 dS/m. The soil texture changes from clayey sandy soil to sandy loam clay. The plant density is also about 152 to 205 bush per hectare. The average number of fruits for each plant is six. Due to the drought in the region, this plant can cultivate instead of some traditional products (Wheat or Alfalfa) and help people to earn enough money and support medicine industrial.

**Keywords:** Medical plant, Habitat, Density, Soil, *Citrullus colocynthis*

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## Effect of Plant Density, Planting Date and Method on Yield and Yield Components and Some Phytochemical Characteristics of *Echium amoenum*

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In order to evaluate of plant density, planting date and method and comparison of organic and chemical fertilizers and biofertilizers on yield and yield components and some phytochemical characteristics of Iranian Ox-Tongue (*Echium amoenum*), 3 experiments was conducted in 2011-2014 growing seasons, in Ferdowsi University of Mashhad, Iran. In first experiment, the main and sub plots included 3 plant densities (10, 5 and 3 plants per m<sup>2</sup>) and 3 types of organic fertilizers and one type of chemical fertilizer (compost, vermicompost, cow manure, nitrogen chemical fertilizer and control), respectively. In second experiment, Two different planting dates (10 March 2011 and 4 April 2011), three different types of biofertilizers and chemical fertilizers (mycorrhiza (*Glomus mosseae*), Biosulfur, chemical fertilizer and control), two different types of planting methods (direct seeding and transplanting) and two agronomic year assigned to main plots, sub plots, sub-sub plots, sub-sub-sub plots, respectively. In third experiment, Treatments included seven different types of soil amendments and biofertilizers concluded: 1- humic acid, 2- fulvic acid, 3- Nitroxin (containing *Azotobacter* spp. and *Azospirillum* spp.), 4- Biophosphorous (containing *Bacillus* sp. and *Pseudomonas* sp.), 5- Biosulfur (containing *Thiobacillus* spp.), 6- Mycorrhiza (*Glomus mosseae*), 7- Mycorrhiza (*Glomus intraradices*), and 8- no fertilizer as control. In first experiment, The results showed that the highest antioxidant activity obtained in 10 plants per m<sup>2</sup> (79 mg/ml) and the highest total phenolic observed in 5 plants per m<sup>2</sup> (51 mg GAE/g flower DW). Compost, vermicompost, cow manure and chemical fertilizer increased total phenolic 51, 35, 40 and 63% compared to control, respectively. Application of vermicompost and cow manure in density of 3 plants per m<sup>2</sup> increased total flavonoid 39 and 38% compared to control, respectively. The highest total anthocyanin obtained in density of 5 plants per m<sup>2</sup>. Vermicompost and cow manure increased seed oil 10 and 13%, respectively, and seed protein 34 and 13%, respectively compared to control. In second experiment, The results showed that the highest dry flower yield obtained in March planting date and seeding method and in conditions of mycorrhiza application. Application of biofertilizers and chemical fertilizers in both of planting dates and both of planting methods increased seed yield, so that application of mycorrhiza, biosulfur and chemical fertilizer in transplanting planting method and April planting date increased seed yield 45, 42 and 35% compared to control, respectively. In third experiment, The results showed that humic acid, fulvic acid, biosulfur and *Glomus mosseae* increased flower yield 36, 27, 26 and 30% respectively and improved seed yield 32, 22, 21 and 16% compared to control, respectively. The highest total phenol obtained in biosulfur treatment. Total anthocyanin in humic and fulvic acids was 38 and 33% more than control, respectively. Biophosphorous and biosulfur biofertilizers increased the antioxidant activity 8 and 7% compared to control, respectively. *Glomus mosseae* and *Glomus intraradices* increased seed oil 20 and 15% and seed protein 30 and 18% compared to control, respectively. In general, based on the results of this research, it seems by using eco-friendly inputs and determine of optimum plant density and direct seeding of Iranian Ox-Tongue in March can be improve quality and health of product and decrease the damages of chemical inputs.

**Keywords:** Antioxidant Activity, Biosulfur, Humic Acid, Mycorrhiza

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## A Comparative Study on Chemical Composition and Antibacterial Activity of *Paeonia Tomentosa* Various Parts Growing Wild in Iran.

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*Paeonia tomentosa* L., as an herbaceous perennial and flowering plant is from Paeoniaceae. In this research different parts of *Paeoniatomentosa* L. including fruits, stems, roots and leaves were investigated for a comparative identification of essential oil composition. Its components were identified and then were compared by GC/MS. The study leads to the identification of 60, 60, 34 and 69 components in the essential oil obtained from fruits, stems, roots and leaves respectively. They constitute approximately more than 99% of the essential oil. Some these identified compounds are common in all parts ( $\alpha$ -Pinene, 4-ethyl Octane, 5-methyl Nonane, Benzaldehyde, Myrtanal, 4,7-dimethyl benzofuran, n-decane, Cumin aldehyde, cis-p-mentha-6,8-diene-2-ol, Salicylaldehyde, tetradecane, tetradecanal and n-tricosane) while the compounds including Cembrene (1.04%), 13-epimanol (1.46%), 2-hydroxy methyl ester benzoic acid (10.03%) and tridecanal (0.68%) were exclusively confirmed in fruit, stem, root and leaf respectively. The antibacterial activity (MIC) of four studied *Paeonia* parts were conducted against *Escherichia coli* and *Staphylococcus aureus*. The most sensitive microorganism to the oil was *Staphylococcus aureus* with the lowest MIC value of 0.031 mg mL<sup>-1</sup> for fruits samples.

**Keywords:** *Paeonia tomentosa*, Essential oil, GC/MS.

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**Investigation of the Antioxidative Effect of Hidroalcoholic Extract of Olive (*Olea europaea L.*) Leaves on Oxidative Stability of Soybean Oil.**

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Due to the known antiradical activity of plant compounds and their derivatives, it has been great attention to add them to the food and biological systems as antioxidants. This study was conducted to evaluate the antioxidant properties of ethanolic extract of four (Zard, Dezful, Roghani and Shiraz) cultivars of olive leaves on oxidative stability of Soybean oil in comparison with a synthetic antioxidant (TBHQ). To study the oxidation changes during the storage period, anisidine and peroxide value were evaluated. According to the results, ethanolic extract of olive leaf showed positive effect on reducing the rate of oxidation due to its phenolic compounds. During the storage period in all samples, as the concentration of the extracts increased, anisidine value was significantly decreased ( $p < 0.05$ ). In all days, control sample without any antioxidant showed higher anisidine value. While the sample contained olive leaf extract of Roghani cultivar with a concentration of 2000 mg/kg, showed the least anisidine value. During storage time, in all samples, as the concentration of the extracts increased, peroxide value was significantly decreased ( $p < 0.05$ ). Oil sample contained 2000 mg/kg ethanolic extract of Roghani cultivar, had lower peroxide value than other groups during storage days. In all days, sample without antioxidant significantly showed the higher peroxide value ( $p < 0.05$ ). Roghani cultivar showed the least anisidine and peroxide value and in some cases it's antioxidant properties was the same as TBHQ, after that Zard, Desful and Shiraz cultivars showed good antioxidant effect, respectively. The results of this research showed that olive leaf could be used as a natural source of antioxidants and replaced with synthetic antioxidant compounds in the food industry to reduce the undesirable effects of synthetic antioxidants.

**Keywords:** Antioxidant; Anisidine; Oxidative stability; Peroxide; Soybean oil.

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**Evaluation of Acetone Extract of Olive (*Olea europaea L.*) Leaf on Soybean Oil Oxidation.**

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Nowadays, due to the adverse effects of synthetic antioxidants, tendency to use natural antioxidants has been increased. For this reason, this study was conducted to evaluate the antioxidant activities of acetonic extract of four cultivars (Zard, Roghani, Shiraz and Dezful) of olive leaves which extracted via microwave assisted extraction method at two different concentrations 1000 and 2000 mg/kg (ppm) on oxidative stability of soybean oil that was stored at 60 °C (for accelerating the oxidation) during 30 days in comparison with a synthetic antioxidant (TBHQ). To evaluate the oxidation, peroxide and anisidine value of oil samples were measured during storage period. Totox value was calculated to indicate oil's overall oxidation state. The results showed that during the storage period, totox value in control group, that was refined soybean oil without any antioxidant, was significantly ( $p < 0.05$ ) higher than treatment groups with acetonic extract of olive leaf (natural antioxidants) and synthetic antioxidant (TBHQ). Acetonic extract of all cultivars of olive leaf, with the concentration of 2000 mg/kg, significantly ( $p < 0.05$ ) inhibited oxidation than the concentration of 1000 mg/kg and showed lower totox value. Olive leaf extract showed antioxidant effect compared with the control group. In all samples, as the concentration of the extracts increased, antioxidant effect was significantly increased ( $p < 0.05$ ). Dezful cultivar showed the best antioxidant effect in comparison to Zard, Roghani and Shiraz. The results of this research showed that olive leaf extract could be used as a bioactive source of phenolic compounds and as a natural preservative with antioxidant property, to restrict the lipid oxidation in oils.

**Keywords:** Antioxidant, Oxidative stability, Soybean oil, Olive leaf extract





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## Effect of Carvacrol on Herpes Simplex Virus Type 1.

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Herpes Simplex Virus type 1 belongs to herpes viridae family is a human pathogen with benign lesions which in immunocompromised patients create more serious problems. Acyclovir is used to treat herpetic infections. Because of developing of drug resistant strains, use of medicinal plants and their related compounds with fewer side effects is considered for the treatment of patients. Therefore, in this study the antiviral effect and mechanism of action of carvacrol, a medicinal compound, on HSV1 virus were studied. In this study, maximum nontoxic concentration of carvacrolon vero cells was determined by MTT assay. The antiviral effect of the compound was determined by TCID<sub>50</sub> and the expression of early and late genes of UL52 and UL27 was evaluated by Real time PCR method, respectively. The toxic concentration of carvacrol inducing 50% cell death (TC<sub>50</sub>) was 0.001%. The mechanism of action of the compound showed that pretreatment of HSV-1 with carvacrol prior to infection inhibited its infectivity approximately 70%. The results also showed no reduction in the early and late gene expression of herpes virus replication. Overall, findings showed that carvacrol has inhibitory effect against HSV-1 by direct inhibition of free virus particles.

**Keywords:** Herpes simplex virus type 1, Carvacrol, Antiviral activity

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## Investigation of Gamma Rays on Oil And Chlorophyll Content, Number of Capsule and Seed on the M2 Generation of Purslane (*Portulacaoleracea* L.)

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Breeding activities are based on diversity and selection. Techniques of induction mutation are useful methods for increasing genetic diversity in plant species. In order to investigate the effect of gamma rays on some of the morphological and phytochemical traits of purslane, the seeds of this plant were treated by gamma rays doses at 0, 200, 300, 400 and 500 grays. Irradiated seed were cultivated to produce the M2 generation. In the M2 generation, traits such as number of capsules in plant, number of seed in capsule, seed oil content, total chlorophyll content were measured. The differences among gamma ray doses for all studied traits were significant at 1% probability level. The highest number of capsules in plant was observed in 300 gray of doses, which had a significant difference with other treatments. The maximum number of seeds in capsule was observed at 500 grays, which did not have significant difference with 400 grays. The maximum of oil content was obtained at 400 grays of doses, and maximum of total chlorophyll was observed in control which had not a significant difference with 500 grays.

**Keywords:** Mutation breeding, Oil content, Chlorophyll, Portulaca, Seeds

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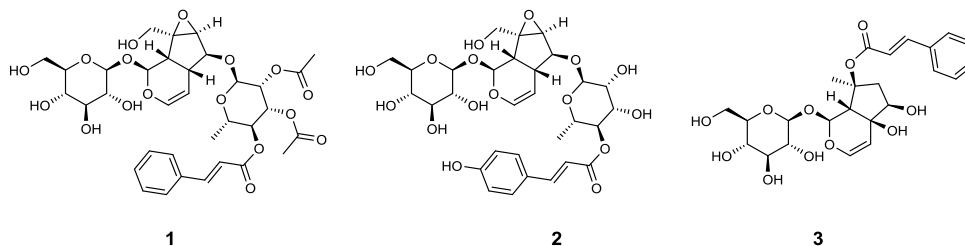
Phytochemical Profiling of an Ethylacetate Extract from *Scrophularia umbrosa* by LC-PDA-ELSD-MS

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The genus *Scrophularia* belongs to *Scrophulariaceae* commonly known in Persian as “Gole meimuni.” It is important to plant species and widely distributed genera in central Europe, Asia, and North America, especially in the Mediterranean area. From ancient times, many species of this family have been used in traditional medicine for a variety of ailments such as skin disorders, inflammatory conditions and phototherapy. It is reported that different compound classes such as iridoids and iridoid glycosides, phenyl propanoide, phenolic acids, flavonoids, saponins, and terpenoids were existed in this genus. Several biological activities have been reported from plants of this family including anti-inflammatory, anti-bacterial, cardiovascular, diuretic, protozoacidal, fungicidal, cytotoxic, anti-nociceptive and wound healing. In this study, the phytochemical investigation of ethyl acetate extract from aerial parts of *Scrophularia umbrosa* carried out by LC-PDA-ELSD-MS techniques. In total, 10 compounds identified by investigation of UV and MS spectra and comparing with published data. The major identified compounds were namely: compound (1), scrodotoside F (2), 1-[4-hydroxy-2-methyl-6-[-3,4,5-trihydroxy-6-(hydroxymethyl)oxan-2-yl]oxyphenyl] ethanone and harpagoide.



**Keywords:** Scrophularia, LC-MS, Phenyl propanoide, Figwort

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Study Dna Methylation Level Changes in Mexican Lime Tree under *Candidatus Phytoplasma Aurantifolia* Stress by Lc-Ms/Ms-Mrm

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Aberrant cytosine (C) methylation and subsequently changes in normal 5-methylcytosine (5mC) level is known to be associated with development of various diseases. 5mC (quintuplicate base, often in eukaryotic and prokaryotic DNA) is an epigenetic mark which has a profound effect on various fundamental processes in cells such as genome stability, gene expression, cellular differentiation, and development. In the present work, DNA methylation level changes were investigated in the healthy and infected Mexican lime tree with lime witches broom phytoplasma (LWBP) and compared with LWBP infected Mexican lime tree treated with fosetyl aluminium (Privacor energy) as resistance inducer using ultrafiltration combined with LC-MS/MS-MRM. In previous paper, they used Dpn I enzyme and ultrafiltration to remove bacteria DNA [1], but here we could remove phytoplasma DNA by using only ultrafiltration. There is no different in DNA methylation level between healthy, infected and treated plant. This Result indicate disease and treatment do not affect on DNA methylation in whole genome.

**Keyword:** Global DNA methylation, LC-MS/MS-MRM, Mexican lime tree, Phytoplasma

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Synthesis of Novel Borneyl Derivatives Containing Triazole Group and Investigate Biological Activities.

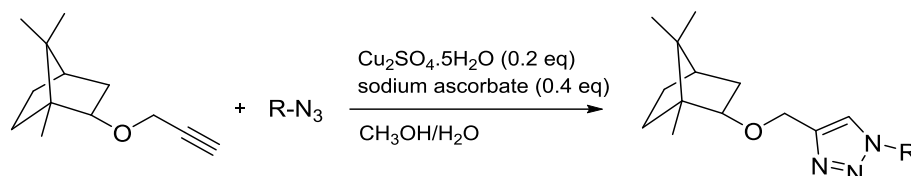
Mona Kamelan<sup>1,\*</sup>, Peyman Salehi<sup>1</sup>, Morteza Bararjanian<sup>2</sup>

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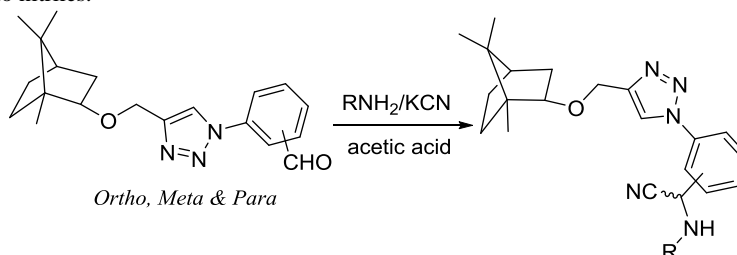
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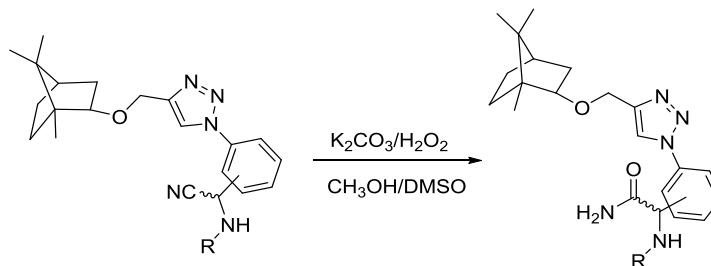
Three classes of novel derivatives of borneol were synthesized. In the first category, 1,2,3-triazole derivatives were obtained as a result of the reaction of bornyl propargyl ether with different azides by copper-catalysed azide/alkyne cycloaddition reaction (CuAAC).



Among these products, three *ortho*, *meta* and *para* benzaldehydes were synthesized as well. In the secondary category the mentioned derivatives reacted with different amines and potassium cyanide via the three-component Strecker reaction to produce the corresponding  $\alpha$ -amino nitriles.



The third category was derived from the conversion of Strecker cyano compounds to their amide derivatives by hydrogen peroxide.



Finally, the anti-microbial activity of the synthesized compounds were investigated against two Gram-positive bacteria *Staphylococcus aureus* and *Enterococcus faecalis* and a Gram-negative bacteria *Escherichia coli*. The minimum inhibitory concentration (MIC) showed that some triazoles and amides were the most potent.

**Keywords:** Borneol, Triazol derivatives, Antibacterial activities



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Phytochemical investigation of *Otostegia persica* Root Extract

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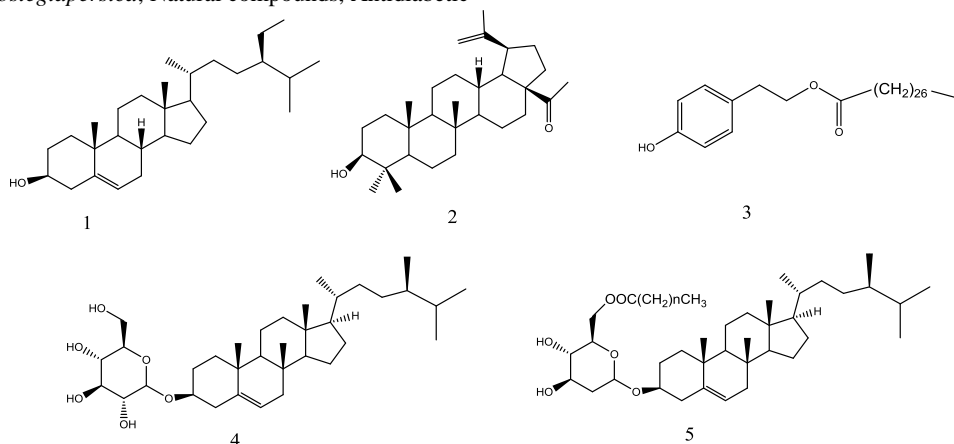
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*Otostegia persica* (Labiatae) is widely distributed in south and south east of Iran. The aerial part and root of this species traditionally used as medicinal herb for treatment of a wide range of disease especially diabetes, hypertension and hyperlipidemia. A literature survey showed that there has been no phytochemical study on the roots of *O. persica*. In this study we have undertaken a phytochemical investigation on acetone extract from the roots of this species and reported the isolation and identification of five natural compounds namely beta-Sitosterol (1), Betulinic acid, Bongardol, Daucosterol and its derivative. Structural elucidation of these compounds were established by their spectral data including 1D and 2D NMR experiments.

**Keywords:** *Otostegia persica*, Natural compounds, Antidiabetic



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Investigation of Seed Germination and Dormancy Breaking in Three Species of *Astragalus L.*

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The genus *Astragalus L.* is the largest genus of flowering plants in the country, and it has the highest diversity in Iran. *Astragalus L.* is important in terms of medicinal, forage, and economic in Iran. The present study was carried out to investigate the seed germination, and to determine suitable treatments for breaking of the seed dormancy of the three *Astragalus L.* species in a full randomized design with four replications in the research greenhouse of the National Iranian Botanical Garden. The treatments used in this study included scratching, scratching+wet chilling, scratching + soaking in warm water, scratching + wet chilling + soaking in warm water, and control treatment. Chilling was carried out at 4°C for 2 weeks, and warm water treatment was applied at 45°C for 5 hours. The results showed that in each of the three species, the seeds need to be treated to break seed dormancy. In *A. brachyodontus* and *A. nigricans* species, germination rate was significantly different at 1% probability level from the other treatments in the treatment of scratching + wet chilling. In *A. askius*, the treatment of scratching + soaking in warm water showed a significant difference at 1% probability level with other treatments. The results showed that seed dormancy may be physiological; because the highest seed germination rates were obtained by applying the wet chilling and/or soaking in warm water treatments with scratching.

**Keywords:** *Astragalus L.*, Seed Germination, Treatment

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## Packaging Methods and Storage Duration Affect Essential Oil Content and Composition of Hyssop (*Hyssopus officinalis* L.)

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Changes in essential oils content and composition of hyssop (*Hyssopus officinalis* L.) at different packaging methods (packaged with air, nitrogen, or under vacuum) and during storage period (6 months) were determined. All the samples were hydro-distilled for EO content evaluation. EO composition was determined by gas chromatography and gas chromatography–mass spectrometry. The results showed that by extending the storage period in all packaging methods, EO content was significantly decreased (approximately 0.31%). Parallel to the increase in the storage duration in all packaging methods, *cis*-pinocamphone, as the main component of the essential oil of hyssop, was decreased. Packaging of hyssop under vacuum preserved the highest *cis*-pinocamphone content during 6 months of storage and achieved the desired amounts of  $\beta$ -pinene and *trans*-pinocamphone.

**Keywords:** (*Hyssopus officinalis* L.), Essential oil, Packaging, Storage, *cis*-pinocamphone

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## Production of some Medicinal Plants in Aeroponic System

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The technique of aeroponic culture is an alternative of the soil-less culture method in growth-controlled environments. The underground organs are enclosed in a dark chamber and supplied with a solution of mineral nutrients with a mist device. Aeroponic system optimizes root aeration, which a major factor is leading to a yield increase as compared to classical hydroponics. Other advantages have been including the recirculation of nutrient solution, a limited amount of water used, good monitoring of nutrients and pH. This technique has been applied successfully for the production of different horticultural and ornamental species. Harvesting in aeroponics is convenient, clean, and allows a greater size control by repeated harvesting. To this purpose aeroponic system and soil culture in Valerian, Chicory, Withania and Echinacea were investigated. The results indicated that the effects of production system were significant and aeroponic system has produced the highest of plant height, root length, number of leaves, dry weights of the shoot and root, fresh weights of the shoot and root, Chlorophyll a, Chlorophyll b and carotenoids traits in studied plants. In overall, these result showed that the aeroponic system is a potential method for using in Valerian, Chicory, Withania and Echinacea.

**Keywords:** Chicory, Echinaceam, Soilless culture, Valerian, Withania

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## Determination of Germination Cardinal Temperatures in Two Color of Chia Seed (*Salvia hispanica* L.) Using Two Regression Models

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Chia (*Salvia hispanica* L.), an annual herb of the Lamiaceae family, produces seeds which were one of the basic foods of central American civilizations in pre-Columbian times. Chia seed contains the highest known percentage of  $\alpha$ -linolenic fatty acid of any plant source. In recent years, chia seed has become increasingly important for human health and nutrition because of its high content of  $\alpha$ -linolenic fatty acid, and the beneficial health effects that arise from its consumption. Therefore, understanding of its temperature needs is necessary for its appropriate germination, growth and development. In present study two regression models (Intersected-lines model, Polynomial model) were used for describing the relationships between germination rate and temperature in two seed color of *Salvia hispanica* L. Temperature treatments were included of eight constant temperatures including 5, 10, 15, 20, 25, 30, 35 and 40 °C. The experiment was conducted at seed research laboratory of University of Shahid beheshti, based on a completely randomized design with four replications. Results showed that cardinal temperatures of black chia seeds by using intersected-line model and polynomial model obtained at  $T_b=7.35-7.26$ ,  $T_o=32.99-29.99$ ,  $T_m=47.73-55.65$  respectively. For white chia seeds these temperatures by using the same models recorded at temperatures of  $T_b=6.91-7.29$ ,  $T_o=32.65-29.99$ ,  $T_m=47.21-55.11$  respectively. There was no significant difference between assessing the cardinal temperatures by these two models but our data showed that intersected-line model was a best model to determine cardinal temperatures in chia seeds. Totally, the use of the two models confirms the generally known fact that chia needs higher temperatures for germination.

**Keywords:** *salvia hispanica* L., Germination rate, Optimum temperature

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### Synthesis of Novel Noscaphine Derivatives by a Three-Component Strecker Reaction and Their Antiparasitic Activity

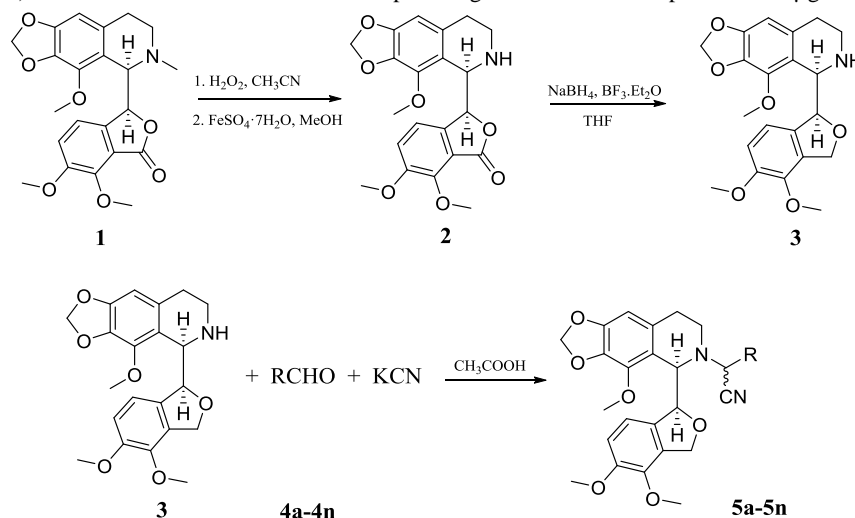
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Noscaphine (1) is a naturally occurring alkaloid with phthalideisoquinoline scaffold that was isolated from *Papaver somniferum* [1]. In this paper, the synthesis of fourteen  $\alpha$ -aminonitrile derivatives of lactone ring reduced *N*-noscaphine (3) by three-component Strecker reaction is reported. The antiparasite activity of the products was investigated against *Trypanosoma b. rhodesiense*, *Trypanosoma cruzi*, *Leishmaniadonovaniaxenic amastigotes* and *Plasmodium falciparum* in two concentrations (10  $\mu$ g/ml and 2  $\mu$ g/ml). Some of the derivatives showed 100 percent growth inhibition of parasites at 2  $\mu$ g/ml concentration.



**Keywords:** Noscaphine, Strecker reaction, Antiparasite activity

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805+814

### Effects of Drought Stress on Some Morphological, and Phenolic Compounds Physiological Characteristics of *Rosmarinus Officinalis*

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This study was performed to evaluate the effects of drought stress on morphological, and Phenolic Compounds physiological Characteristics of *Rosmarinus officinalis* in CRD design with 3 replications in the research greenhouse of Besat Center in Shiraz. Drought stress included 25% FC, 50%FC, 75%FC and 100 %FC (0, -0.4, -0.8 and -1.2 Megapascal). The measured traits included the leaf moisture measurement, dry and fresh weight of shoot and root, leaf area, leaf number, plant length, leaf proline content, internode length, phenolic compounds, total phenol. Data analyzed by using SAS statistical software and comparison of the means performed by using Duncan test at 5% level. According to results, it was founded that in rosemary, the studied traits reduced by the increasing of drought stress and lowest means of fresh weight of shoot (15.3 g), fresh weight of root (10.6 g), aerial part (40.4 cm), dry weight of shoot (6.76 g), dry weight of root (3.35 g), leaf area (0.75 cm<sup>2</sup>) and leaf number (111) were obtained by 25%FC treatment. Drought stress led to the increase of some components of the essential oil, significantly. 25%FC treatment showed highest Quercetin (439 mg/l), Trans-ferulic acid (72.48 mg/l), Hesperidin (407 mg/l), Eugenol (65 mg/l), Hesperetin (107 mg/l), Rosmarinic acid (1133 mg/l) and proline (79  $\mu$ M/l) of Rosemary.

**Key words:** Drought stress, Rosemary, Morphological and Physiological traits.



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795+813

## Effects of Drought Stress on Some Morphological, Physiological Characteristics and Phenolic Compounds of *Berberis Vulgaris*

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This study was performed to evaluation of drought stress effects on some morphological and physiological traits of medicinal plants of *Berberis* in CRD design with 3 replications in the research greenhouse of Besat Center in Shiraz. Drought stress included 25% FC, 50%FC, 75%FC and 100 %FC (0, -0.4, -0.8 and -1.2 Megapascal). The measured traits included the leaf moisture measurement, dry and fresh weight of shoot and root, leaf area, leaf number, plant length, leaf proline content, internode length, phenolic compounds, total phenol. Data analyzed by using SAS statistical software and comparison of the means performed by using Duncan test at 5% level. According to results, the studied traits reduced by the increasing of drought stress and lowest means of the fresh weight of the shoot (4.3 g), the fresh weight of the root (6.6 g), the shoot length (51.3 cm), the root length (26 cm), the dry weight of the shoot (3.44 g), Dry weight of root (2.98 g), leaf area (3 cm<sup>2</sup>) and number of leaves (38) were obtained by 25%FC treatment. According to results, Drought stress led to the increase of some components of the essential oil, significantly. 25%FC treatment showed highest Gallic acid (1125 mg/l),Chloregenic acid (2490 mg/l),Coumarin (54.9 mg/l) and proline (101 µM/l) in *Berberis*.

**Key words:** *Berberis*, Drought stress, morphological and physiological traits,

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## The Effect of Seed Priming on MDA, Alpha, Gama And Delta Tocopherol and Solube Sugars Levels of Milk Thistle (*Silybum Marianum*) Seeds Under Salinity

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Milk thistle is one of the most important medicinal plants of Asteracea family that had very medicinal poperties. The seeds of this plant consist of silymarin (a flavonolignan complex) and 20–35% fatty acids, including linoleic acid. Silymarin is a complex mixture of polyphenolic molecules, including seven closely related flavonolignans (silybin A, silybin B, isosilybin A, isosilybin B, silychristin, isosilychristin, silydianin) and one flavonoid (taxifolin). This study was conducted to evaluate the physiological and biochemical mechanisms of seed priming treatment which improved the quality of milk thistle (*Silybum marianum*) seeds. . This step was conducted in Agricultural Biotechnology Research Institute of Iran (ABRII) and its experimental design was arranged in a completely randomized design with three replications and four factors. The factors were first: genotype (Amol and Major), second: primed and non-primed seeds, third: salinity (150 mM) and controlled (non-salinity) conditions and the fourth: time of sampling in 24 and 96 hours after sowing. Biochemical indices that were analyzed in this step included malondialdehyde (MDA), alpha, gama and delta tocopherol levels (vitamin E isomers), soluble sugars total using advanced analyzing methods. Seed priming significantly increased alpha and gama tocopherol level under salinity conditions in both genotypes and significantly decreased MDA level. The level of alpha, gama and delta tocopherol were greater in Major than in Amol. Also, MDA level decreased 24% in primed seeds in comparison to non-primed seeds under salinity stress condition. The effect of seed priming under controlled condition was so considerable that decreased MDA level 11% in primed seeds in comparison to non-primed seeds. From imbibition to germination, alpha, gama and delta tocopherol levels increased and MDA level decreased. The results of evaluating soluble sugars showed that seed priming increased 13% this time under salinity stress condition as compared to controlled condition. Also, soluble sugars level in salinity stress in comparison to controlled condition increased 22.8 % in Major and 13.5 % in Amol. After imbibition, alpha-amylase activity increased significantly in both primed and non-primed seeds.

**Key words:** Milk thistle, Seed priming, Salinity stress, Physiological and Biochemical indices

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## Phytochemical Investigation of Cultivated *Arnica Chamissonis*

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*Arnica* belongs to Asteraceae family, is a perennial herb, native to the North of the United States and European Altitudes. The petals of *Arnica montana* L. and *A. chamissonis* ssp. *Foliosa* have been used in pharmaceutical, and cosmetics industries for their vast biological activity. It has been reported that sesquiterpenes lactones, flavonoids, and phenolic acids, are major class of compounds in petals of plant. The petals of plant have been used for treatment of bruising, sprains, muscle aches, wound healing, joint pain, and inflammation [1]. In this project the phytochemical investigation of hexane and ethyl acetate extract from petals of *A. chamissonis* investigated by HPLC-PDA-MS, GC-MS spectroscopies. The major compounds in the extract isolated by normal silica gel chromatography column and semi-preparative-HPLC. The structure of isolated compounds elucidated by application 1D and 2D NMR spectroscopy, UV-vis and HRMS. The major identified compounds were namely: Glucosyl-7-methoxy-6-luteoline (1), 5,6,7,4'- tetrahydroxyflavone-7-O-(6"-O-acetyl)-β-D-glucopyranoside (2), luteolin-7-O-β-glucoside(3), chrysoeriol (4), chamysonolide (5) and nine fatty acids. The bioactivity of isolated compounds were tested in the tyrosinase enzyme.

**Keyword:** Asteraceae, flavonoid, sesquiterpenes lactones, tyrosinase enzyme

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## Antimicrobial Activity of Essential Oil and Methanolic Extract and Chemical Characterization of the Essential Oils from of *Ulva Lactuca* (*U. Lactuca*) form Gheshm Island via Extracted By Microwave-Assisted Hydrodistillation

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*Ulva lactuca* (*U. lactuca*) green algae growing on rocks or on other algae in the littoral and sublittoral on shores all around the Gheshm Island. The *U. lactuca* crude organic extracts exhibited great potential antibacterial activities against six bacterial strains with minimal inhibitory concentration (MIC) values ranged from 400 to 350 µg/ ml. Data indicate that *U. lactuca* could be considered as potential rich source of natural colorant with antioxidant and antibacterial properties and could be utilized in as natural preservative ingredient in food and in pharmaceutical industry [2]. The aim connected with the actual study feel discover the chemical composition the antimicrobial activity (antibacterial as well as antifungal) of an essential oil associated with methanolic extract of *U. lactuca* species connected with Gheshm island (Iran). The hydro distilled essential oil am analyses by GC-MS. There is a great variability of compounds presented in *U. lactuca* required essential oils. Nineteen various compounds representing 100% of the components in the oil were identified. Hexahydrofarnesyl acetone (20.46%), Heptane (19.30%), 3-methyl pentanol (11.30%), Limonene (10.98%), 8-Heptadecene (7.09%) were found in order to become predominant constituents. The phenolic extract feel examined by HPLC. Carvacrol (0.1736%) and are a major polyphenolic compounds was found to be predominant constituents. *U. lactuca* essential oil showed the highest antimicrobial activity, in MIC ranging between 0.390 AND 12.5 mL/ mL against bacteria and every one of the fungal strains.

**Keyword:** *Ulva lactuca*, Hesperetin, carvacrol, Antifungal Effect, antimicrobial effect.

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## Bio-assay Guided Isolation of *F. hezarlalehzarica* Active Principles and Determination of Their Absolute Configuration by Means of Electronic Circular Dichroism

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The genus *Ferula* (Apiaceae) comprises about 180 species spreading throughout the world and some species are used in folk medicine of different countries for treatment of stomachache, hysteria and others. In Iranian flora, the genus *Ferula* is represented by 32 species including 16 endemic representatives [1]. In Iranian traditional medicine *Ferula* species are highly appreciated e.g. the well-known representative *F. assa-foetida* of which the gum has been used as a remedy for abdominal pain, constipation, diarrhea, spasms and others. *Ferula hezarlalehzarica* Ajani, identified in 2008 [2], is an endemic species growing in Kerman province, Iran. This plant is used by the local people for the treatment of gastrointestinal disorders. Phytochemical investigation of the dichloromethane extract of the roots of *F. hezarlalehzarica* resulted in the isolation of eight sesquiterpenes and two monoterpenes. Among the isolated substances two of them were new. The relative configuration of the compounds was assigned by means of NOESY, their absolute configuration was established by comparison of simulated ECD with measured ECD spectra. An initial pharmacological investigation of the isolated compounds in a colorimetric assay (MTT) in MDA-MB-231 cells revealed two active compounds, the p-hydroxy benzoic acid as well as the 3-methoxy-4-hydroxy benzoic acid analog of ferutinol, which showed identical IC<sub>50</sub> values of 42 μM after 24h incubation.

**Keywords:** *Ferula hezarlalehzarica*, circular dichroism, breast cancer

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