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**12th National Congress on
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Welcome Message

12th National Congress of Medicinal Plants Shahid Beheshti University, Tehran, Iran

Dear Esteemed Colleagues and Distinguished Scientists,

On behalf of the National Network of Research and Technology in Medicinal Plants, it is my great pleasure and distinct honor to welcome you to the 12th National Congress of Medicinal Plants (NCMP2025), hosted this year at Shahid Beheshti University, one of Iran's premier academic institutions.

This congress builds upon a proud legacy of fostering scientific exchange, interdisciplinary collaboration, and practical innovation in the field of medicinal plants. With its broad scope encompassing pharmacy, traditional and modern medicine, agriculture, natural resources, biotechnology, basic sciences, and industry, NCMP2025 offers a vibrant platform for sharing the latest research findings and advancing collective knowledge.

We are pleased to report that this year's congress received over 600 abstract submissions, of which more than 500 have been accepted for presentation after a thorough peer-review process highlighting the growing interest and expanding research capacity in this field. Contributions will be delivered through both oral and poster presentations. In addition to the academic program, a specialized exhibition will provide participants the chance to engage directly with key actors from the herbal products industry, research institutes, and commercial sectors. This unique integration of science and industry is central to the congress's aim of translating research into impactful solutions.

I would like to express my sincere gratitude to all members of the scientific and organizing committees, our diligent peer reviewers, and our generous sponsors, whose commitment and support have been instrumental in bringing this event to life.

We hope your experience at NCMP2025 is intellectually stimulating and professionally rewarding, and that the connections you make here will contribute to the future of medicinal plant science, both nationally and globally.

With warm regards,

Prof. Peyman Salehi

Chair, NCMP2025 Scientific Committee



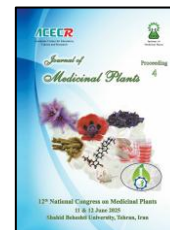
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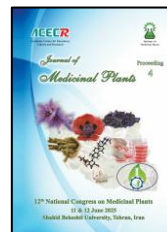
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Oral Presentation



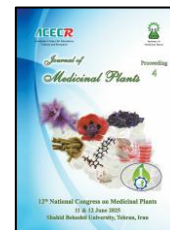
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Oral Presentation ID: 1584

Minoudasht olive collection; A multi potential genetic resources for food and medicine

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ARTICLE INFO

Keywords:

Iranian olive varieties
Abiotic stress
antioxidant properties

ABSTRACT

The olive tree has been an essential part of Iran's agricultural landscape for thousands of years, with its origins in the Mediterranean region. In Iran, olive cultivation dates back to ancient times, likely reaching the country via trade routes or early farming practices from neighboring regions. From the rugged terrains of the Alborz Mountains to the fertile plains of Khuzestan, olives were cultivated for their fruit, oil, and cultural significance, embedding themselves in the country's agricultural tradition. The agricultural, Nutritional and therapeutic potential of olive has prompted the need to develop scientific research on this tree. Among the many agricultural researchers who emerged during this time, the NIGEB Olive Research Group stands out as one of the leading figures in Iranian olive research. Their academic and professional focus has been dedicated to advancing the field of olive cultivation and research, both within Iran and internationally. The group's early efforts were grounded in agricultural science, where they developed a keen interest in the unique challenges faced by Iranian olive farmers. With the rise of the NIGEB Olive Research Group, they were instrumental in the establishment of Iran's first dedicated olive research stations. One of the most significant of these was the Minoudasht Olive Collection, which was founded as part of the long-term vision to create a national database of olive varieties suited to Iran's unique environmental conditions. The Minoudasht Olive Collection would go on to become one of the most important olive research facilities in the country. The NIGEB Olive Research Group was founded with the primary objective of developing scientific and technological innovations to advance olive farming and oil production in Iran. The research group consists of a multidisciplinary team of experts in areas such as plant genetics, molecular biology, agronomy, and biotechnology. Their work has significantly contributed to enhancing the productivity and sustainability of olive cultivation in Iran, improving olive oil quality, and increasing the conservation of olive genetic resources. One of the critical aspects of olive research at NIGEB has been improving the quality of olive oil produced in Iran. The group has carried out extensive studies on various factors that influence oil quality, including cultivation practices, harvesting methods, and oil extraction techniques. Research has focused on the chemical composition of olive oil, its antioxidant properties, and the impact of different olive varieties on oil quality.

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Oral Presentation ID: 1597

Production of recombinant pharmaceutical proteins using molecular farming technology in Iran

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ARTICLE INFO	ABSTRACT
Keywords: Molecular Modification Recombinant Proteins Molecular Farming Genetic Engineering	Molecular Farming is a branch of plant genetic engineering focused on the production of recombinant proteins with pharmaceutical, industrial, and nutritional value in plants. This technology utilizes plant-based expression systems to enable large-scale production of complex proteins, such as antibodies, vaccines, and therapeutic hormones. The production of recombinant proteins in plants (Plant-based Biopharming) has emerged as an efficient alternative to conventional systems, such as mammalian cell cultures and bacterial systems. Plants are considered an ideal platform for the production of bioactive compounds due to their low production costs, high scalability, lack of need for sophisticated equipment, and reduced risk of contamination with human pathogens. In Iran, extensive research has been conducted on the production of pharmaceutical proteins, including proinsulin, interferons, growth factors, and plant-based vaccines. In this brief review, we aim to explore molecular farming and highlight some of the successes achieved in this field in Iran. Over nearly two decades of research on molecular farming at Tarbiat Modares University, various recombinant proteins have been produced, including single-domain VHH antibodies in tobacco, tPA protein in tobacco, and human gamma interferon in canola. Additionally, numerous valuable projects have been carried out on the transfer of therapeutically relevant genes into plants (transplastomics) to achieve targeted gene expression in chloroplasts.

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Oral Presentation ID: 1594

The role of medicinal plants in animal health and production

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ARTICLE INFO	ABSTRACT
Keywords: Medicinal plants Herbs Animal health Antimicrobial Essential oils	Medicinal plants have long served as vital resources in both human and animal health systems, offering a vast array of bioactive compounds with therapeutic and functional properties. In recent years, the utilization of phytochemical compounds in livestock production has gained traction due to growing concerns over synthetic drugs, including antibiotic resistance, chemical residues in food products, and escalating input costs. These plant-derived agents -rich in secondary metabolites such as flavonoids, tannins, saponins, and essential oils- exhibit a wide spectrum of biological effects, including antimicrobial, antioxidant, immunomodulatory, and growth-promoting actions. Their incorporation into animal nutrition, particularly as phytobiotics or botanical feed additives, has shown promise in enhancing productivity, supporting reproductive health, improving feed efficiency, and reducing disease incidence. Moreover, several of these compounds assist in regulating gut microbiota and optimizing rumen fermentation, resulting in reduced methane and ammonia emissions -an added benefit in addressing environmental sustainability in animal agriculture. This review synthesizes literature sourced from major scientific databases including PubMed, ScienceDirect, Scopus, and ResearchGate. The findings underscore the practical benefits of phytochemical interventions in animal husbandry, particularly in organic and alternative livestock systems where synthetic interventions are limited or discouraged. Beyond their physiological impacts, medicinal plants provide a strategic avenue to phase down the use of conventional antibiotics and hormones. This has broader implications for food safety and public health, as reduced drug residues and antimicrobial resistance in the food chain can significantly benefit human consumers. As traditional ethnoveterinary knowledge continues to reveal new potentials, preserving and integrating this wisdom into modern systems remains imperative for the future of sustainable animal health management.



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Transforming saffron's carotenoids: high-yield crocetin production and pharmaceutical optimization

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ARTICLE INFO

Keywords:

Carotenoids
Crocetin
Pharmacological
Saffron

ABSTRACT

Crocetin, a key carotenoid found in saffron, exhibits a wide range of pharmacological activities, including antioxidant, neuroprotective, anti-inflammatory, and oxygenation-enhancing effects. However, in the plant, crocetin predominantly exists in its glycosylated forms as crocins, while the free form is present only in trace amounts. Additionally, its hydrophobic nature and poor water solubility significantly limit its pharmaceutical potential. Building on our previous research [1-3], this study aimed to optimize the hydrolysis process to convert total crocins into crocetin, develop a cost-effective purification strategy, and enhance its aqueous solubility for therapeutic applications. A four-step purification protocol was developed to obtain high-purity crocetin: (1) Acid hydrolysis to convert crocins to crocetin, increasing its content from 0.04% to 22.1%; (2) removal of carbohydrates with water, raising purity to 41.5%; (3) methanol reflux to eliminate polyphenols, reaching 61.5% purity; and (4) final recrystallization, yielding crocetin with 99.3% purity. Hydrolysis conditions were optimized using a Design of Experiments (DoE) approach, achieving an 85% conversion yield. Notably, in contrast to previous studies that overlooked by-products, this work revealed that picrocrocin hydrolysis occurs simultaneously with crocin conversion, resulting in a 12-fold increase in safranal content. To address solubility limitations, crocetin was further converted into disodium crocetin, a water-soluble salt with improved pharmacokinetic properties. This conversion enhances its potential for treating ischemic conditions and oxygenation-related disorders. Overall, the proposed method offers an efficient, scalable, and cost-effective approach for the production and pharmaceutical development of crocetin and its derivatives.

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Oral Presentation ID: 1114

Medicinal Plants against Drug-induced toxicity: Dexamethasone and *Cynodon dactylon* challenges

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ARTICLE INFO

Keywords:

Dexamethasone
Hepatic injuries
Hypolipidemic effect
Glucose Uptake

ABSTRACT

The protective effects of ethanolic extract of *cynodon dactylon* on Dexamethasone (DEX, D)-induced hepatic injuries were investigated. Following GC-MS phytochemical analyses of the extract, *in vivo* studies were conducted on male rats, which were grouped as: control, Dexamethasone (8mg/kg, *IP*), D+CD (100, 200 and 400 mg/kg, orally), CD 400 and D+metformin (MET, 300mg/kg, orally) for 15 days. The *in vitro* studies were performed on HepG2 cells that grouped as: Control, DEX (1 μ M), D+CD (0.1, 0.5 and 1mg/ml), CD 0.5, D+MET (500 μ M). Cell viability and animal weight changes were recorded. Following study period, the biochemical and histopathological analyses were conducted on hepatic tissue and HepG2 cells. Findings revealed that CD extract does have concentration-dependent free radical scavenging activity, phenols and flavonoids contents. The most abundant compound of the CD extract was n-Hexadecanoic acid. The DEX-induced ALT, AST and LDH levels were significantly ($p < 0.05$) reduced in both models. Moreover, the DEX-induced oxidative stress was improved by CD extract (45%). The DEX-elevated blood glucose (20%) and triglycerides (60%) were reduced in CD-treated animals. The DEX-generated hepatic macrovesicles and lipid droplets in HepG2 cells was reduced. These results suggest that CD extract could be an effective compound for protection from DEX-induced hepatic injuries.



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Oral Presentation ID: 1111

Extraction, Purification and Nano-preparation of Saffron Carotenoids for Breast Cancer Treatment

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ARTICLE INFO	ABSTRACT
Keywords: Breast cancer cells Animal Models of Breast Cancer Crocine Crocetin Saffron Stigma	Saffron carotenoids (Crocine and Crocetin) are abundant in its Stigma and are responsible for its color. Various biological and pharmacological properties have been reported for these carotenoids (1). In the present report, I will discuss the anticancer effects of Crocine and Crocetin in different cancer cell lines as well as in the animal models of breast cancer. During the last 20 years we studied and compared the anticancer effects of Crocine and Crocetin in a panel of breast cancer cell lines from triple-positive to triple-negative cells. In addition, we studied the effect of these ingredients on animal models of breast cancer in rats and mice in both preventive and therapeutic applications (2). Targeted drug delivery was also applied to improve the anticancer effect of these natural products (3). Our results indicated the effectiveness of both Crocine and Crocetin. However, there are slight differences between these ingredients and the induction of signaling pathways in breast tumors. These data indicated their potential for use in precision medicine, which is the subject of future studies.

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Oral Presentation ID: 1581

Increased production of medicinal compounds in plants under the influence of precursor feeding and stimulants

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ARTICLE INFO	ABSTRACT
Keywords: Herbal Medicines Precursors Stimulants	Plants have long been used as folk herbal medicines to treat various disorders and their different natural products have inspired the design, discovery, and development of new drugs. The vast majority of natural compounds cannot yet be synthesized economically and are still obtained from wild or cultivated plants. The World Health Organization (WHO) has predicted that by 2050, the global market for medicinal plants will reach 5 trillion dollars [1]. The presence of bioactive plant-derived compounds in 25% to 50% of prescription drugs worldwide highlights the substantial economic value of medicinal plants in human society [2]. Due to the high demand for these compounds, their complex chemical synthesis, low natural production, and costly extraction process, significant efforts have been made to enhance their production through various biotechnological approaches, including cell culture, callus and hairy root culture, metabolic engineering, stimulation, and precursor feeding [3]. One of the most advanced and effective strategies to enhance the yield of valuable compounds is Precursors feeding and the stimulation of synthetic pathways in cell suspension and hairy root cultures. The production and accumulation of secondary metabolites in plant cells are part of their defense response against pathogens, as well as physical and chemical stressors. These responses are triggered by various internal or external molecules known as elicitors, which are widely used to induce plant metabolite production. The use of different elicitor causes different morphological and biochemical changes and changes in the gene expression. nevertheless, biotic and abiotic stimulants are used to motivate the natural molecules creation in a short time, as well as to reach the maximum hairy roots biomass and boost metabolites in hairy roots culture. Precursors include various biological compounds that exist at the beginning or in the middle of the natural metabolite biosynthetic pathway. adding them to the culture media can boost the production rate of the desired final product. Amino acids are among the compounds that are used as precursors in culture media to enhance the secondary metabolites production. By using all kinds of stimulants, especially nanoparticles and precursors, it is possible to increase the production and accumulation of bioactive compounds in medicinal plants.

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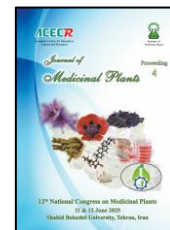
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Oral Presentation ID: 1145

New Antifungal Edible Tomato Coatings: Containing *Trachyspermum ammi*, *Citrus aurantium* and *Rosmarinus officinalis* Essential oils

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ARTICLE INFO	ABSTRACT
Keywords: Coating Volatile oils <i>Fusarium</i> Tomato	This study evaluated the antifungal activity of essential oils (EOs) derived from <i>Trachyspermum ammi</i>, <i>Citrus aurantium</i> (flowers), and <i>Rosmarinus officinalis</i>, along with their maltodextrin-based coatings, against <i>Fusarium oxysporum</i>, a predominant fungal pathogen affecting tomato crops in Tehran, Iran. The phytochemical composition of the EOs was analysed using GC and GC–MS, and their inhibitory effects on spore germination, mycelial growth, and fungal infection progression in tomato fruits were assessed. GC–MS analysis identified thymol (48.74%), <i>p</i>-cymene (23.04%), and γ-terpinene (20.49%) as the primary constituents of <i>T. ammi</i> EO. The major components of <i>C. aurantium</i> EO were linalyl acetate (53.40%), linalool (19.37%), α-terpineol (6.52%), and geranyl acetate (4.14%), while <i>R. officinalis</i> EO predominantly contained 1,8-cineole (37.50%), α-pinene (37.03%), <i>o</i>-cymene (6.14%), and isoborneol (6.00%). In the spore germination assay, <i>T. ammi</i> EO exhibited the highest inhibitory activity (IC_{50} = 0.083 mg/mL), outperforming <i>R. officinalis</i> (IC_{50} = 0.963 mg/mL), <i>C. aurantium</i> (IC_{50} = 1.320 mg/mL), and the synthetic fungicide kresoxim-methyl (IC_{50} = 0.107 mg/mL). Furthermore, <i>T. ammi</i> EO completely suppressed mycelial growth at all tested concentrations (100% fungicidal activity), whereas <i>R. officinalis</i> and <i>C. aurantium</i> EOs showed concentration-dependent inhibition. In <i>in vivo</i> trials, the <i>T. ammi</i>-enriched coating demonstrated the strongest antifungal efficacy, reducing disease severity by 84.2%. Coatings incorporating <i>R. officinalis</i> and <i>C. aurantium</i> EOs also significantly inhibited fungal growth, with reductions of 66.7% and 24.6%, respectively. These results suggest that <i>T. ammi</i> EO-based coatings are a promising natural solution for bioactive packaging to mitigate <i>F. oxysporum</i> infections and enhance the postharvest shelf life of tomato fruits.

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Protective effects of *Origanum vulgare* L. leaf aqueous extract on spermatogenesis in testopathy induced by Cisplatin chemotherapy drug; an experimental study

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ARTICLE INFO	ABSTRACT
Keywords: <i>Origanum vulgare</i> L. Spermatogenesis Cisplatin Chemotherapy NMRI mice	Cisplatin (Cis), as a common chemotherapy drug, induces testopathy and germinal epithelium (GE) degeneration. <i>Origanum vulgare</i> L. (OV) leaf extract, with anti-oxidative features, can probably alleviate cellular damage. This experimental study was designed to assess protective or therapeutic features of OV on Cis-induced testopathy. 48 male NMRI mice were caterozied into 6 groups. Testopathy was induced by intraperitoneal (IP) injection of Cis (single dose of 1mg/kg, day 0). Threatment was applied by OV (400mg/kg orally, 5days/week, for 5 weeks). Phytochemical screening of OV were also assessed. Following protocol implementation, the animals were euthanized and blood serum and testicular samples were collected. Total body and total testicular weights were also recorded. Histopathological HE staining (for gonadosomatic index, GSI) and immunohistechemical (for 3β-HSD protein detection) were considered. Gene expression of P53 and BCL-2 along with serum levels of testosterone (Tes) were assessed. Statiscal data were analysis using SPSS (v.16) and p-value<0.05 was considred as significant. Biochemical assessmenst of OV showed high levels of antioxidant agents. Cis administration highlighted detrimental changes on testicular tissue (p<0.05). Following the administartion of OV in Cis-induced animals, GSI index, Tes levels, histological assessments and total testicular weight were alleviated into the physiological status (p<0.05). Also, IHC staining (3β-HSD protein) aprpved regeneration of Leydig cells. P53 and BCL-2 were down-regulated and up-regulated, respectively (p<0.05). OV administration, with anti-oxidative features, can potentially act as a protective phytomedicine agent against testopathy caused by Cis. OV accelerates GE proliferation, Tes secretion, and reduces apoptotic gene expression.

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Oral Presentation ID: 1496

Advancing Medicinal Plant Conservation: A Multi-Species Habitat Suitability Framework Leveraging Spatial Modeling, Remote Sensing, and Hybrid Machine Learning Algorithms

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ARTICLE INFO

Keywords:

Habitat Suitability
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Conservation Planning

ABSTRACT

Medicinal plants play a vital role in ecosystem stability, traditional medicine, and pharmaceutical industries. However, their habitats are increasingly threatened by climate change and human activities. Spatial habitat suitability modeling, integrating remote sensing (RS) and machine learning algorithms (MLAs), provides a powerful tool for the conservation and sustainable management of these species (Dastres et al., 2025). By leveraging geospatial data and advanced algorithms, we can identify optimal habitats, predict species distribution, and support targeted conservation efforts (Grilo et al., 2024). This study explores the application of 30 individual and ensemble ML algorithms in modeling the habitat suitability of five prominent medicinal plants: *Zataria multiflora*, *Descurainia sophia*, *Salvia leriifolia*, *Ferula gummosa*, and *Nepeta persica*. These species were selected for their ecological importance and vulnerability to habitat degradation. The models incorporated a wide array of predictors, including high-resolution RS-derived indices, topographic metrics, and bioclimatic variables. Our results revealed that ensemble approaches outperformed individual models in most cases, achieving Area Under the Curve (AUC) values consistently above 0.90. Nonetheless, certain individual algorithms, notably Random Forest and Support Vector Machines, demonstrated strong predictive power under specific ecological conditions. The use of RS data was instrumental in enhancing model performance, offering insights into fine-scale environmental heterogeneity often missed by conventional data sources. Overall, the integration of MLAs and RS in spatial modeling proves highly effective for identifying suitable habitats and informing targeted conservation strategies. These methods support a shift toward predictive, adaptive management of medicinal plant resources. Future research should expand to broader species sets and incorporate dynamic climate projections to strengthen long-term planning. This integrative approach holds significant promise for biodiversity conservation, habitat restoration, and sustainable development.

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Oral Presentation ID: 1515

Process Optimization, Techno-Economic Analysis and Risk Assessment of Enriched Phenolic Compounds from Grape (*Vitis vinifera* L.) Pomace Extract using a Macroporous Resin

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ARTICLE INFO

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Grape pomace
Techno-economic
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Process optimization
Phenolic compounds
Adsorption

ABSTRACT

Processing grape pomace (GP), a major waste from grape-based beverage industry, into multiple value-added products based on the biorefinery concept has a potential to reduce waste disposal and promote a sustainable bioeconomy. In this study, the extraction and enrichment process of polyphenol compounds (PCs) from grape (*Vitis vinifera* L.) pomace using a macroporous resin (LXA-10) and water as a green solvent was investigated, followed by a comprehensive techno-economic analysis (TEA). Initially, the influence of process variables of extraction temperature (40–80 °C), solid-to-liquid ratio (1:8–1:40 g/mL) and time (4–16 h) on the total phenolic content (TPC) and extraction yield (EY) of polyphenol-rich extracts were evaluated using artificial intelligence. Multi-objective process optimization was also carried out using the desirability function algorithm. The optimum process variables were later applied to design an integrated process for the production of PCs extract with the assistance of SuperPro Designer software. Risk and sensitivity analyses were performed on the selected industrial-scale process using data analytics and Pearson correlation coefficient to assess the influence of technical and economic parameters. The extraction temperature of 80 °C, solvent-to-feed ratio of 20 mL/g and time of 10 h gave the optimum TPC of 31.94 mg GAE/g dry basis and EY of 10.67 % (w/w). The process was first simulated at pilot-scale in batch mode, showing consistency with experimental data (1.88 kg per batch). Upon validation of the pilot model, a continuous industrial-scale process was developed. The preliminary TEA indicated that plant capacity has a strong reliance on the material & energy demands and process economics. The estimated financial indicators included a net present value (NPV) of 3.8 million US-\$, an internal rate of return (IRR) of 17.11%, and a payback period of approximately 5 years. Sensitivity analysis revealed that the polyphenol selling price, polyphenol content in GP, resin purchase price, and plant capacity had the most significant impact on economic performance. Therefore, it is recommended that further investments be made in the production and purification of high-quality, high-value polyphenols, and that the process be implemented at an industrial scale.

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Oral Presentation ID: 1520

***Salvia hydrangea* synthesized carbon quantum dots: From physicochemical properties to enhanced biological efficacy**

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ARTICLE INFO	ABSTRACT
Keywords: Sage Hydrothermal method Cell Cytotoxicity Antimicrobial	Green-synthesized herbal medicinal carbon quantum dots (HM-CQDs) By integrating phytomedicine within a biocompatible nanostructure offer a unique opportunity to enhance the pharmacological activities of medicinal plants [1]. This eco-friendly and cost-effective strategy can integrate traditional herbal medicine with next-generation plant-based therapies [2]. In this study, <i>Salvia hydrangea</i> cell cultures were used as a scalable and stable source along with its aerial parts for the synthesis of HM-CQDs, and by comparing the resulting nanoparticles, it was investigated how the distinct phytochemical profiles of different plant tissues affect particle size, surface chemistry, and ultimately, their biological activities. For this purpose, hydrothermally synthesized HM-CQDs were characterized for their optical, structural, and morphological properties using UV-Vis, FT-IR, PL spectroscopy, TEM, XRD, and EDX. The biological activities of these nanoparticles, including cytotoxicity, antioxidant potential, and antibacterial effects, were evaluated through MTT assays, DPPH tests, as well as well diffusion assays and minimum inhibitory concentration (MIC) determination. pCQDs had a larger average size (3.7 ± 2.3 nm) compared to cCQDs (2.9 ± 1.9 nm), along with differing surface charges (+15.7 mV vs. -54.9 mV). While cCQDs demonstrated superior colloidal stability and a higher quantum yield (8.3%), pCQDs showed remarkable antibacterial activity, particularly against <i>Staphylococcus aureus</i> (30 mm inhibition zone, MIC = 0.0625 mg/mL). Additionally, pCQDs exhibited strong antioxidant capacity (86% scavenging), surpassing Trolox. Both HM-CQDs displayed excellent biocompatibility, with minimal cytotoxicity on fibroblast cells and negligible hemolysis (<10%) at high concentrations (1000 µg/mL). The distinct properties of synthesized HM-CQDs highlight their multifunctional potential, positioning them as promising candidates for multi-disciplinary applications.

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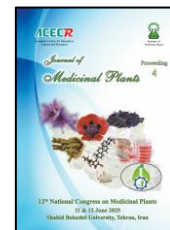
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Oral Presentation ID: 1004

Designing a model of transfer of technology in Iran's pharmaceutical industry and its impact on the development of Iran's pharmaceutical industry

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ARTICLE INFO	ABSTRACT
Keywords: Technology Transfer Pharmaceutical Industry Healthcare Innovation Knowledge-Based Development Iran Health System	The modern world is rapidly changing how we think about medicine. Ideas that once seemed futuristic are now becoming part of everyday healthcare, and those countries that understand and apply these innovations will be better positioned on the global stage—both economically and politically. Since governments are responsible for managing public health, many are turning to advanced technologies and technical knowledge to cut costs and improve the reach and quality of healthcare services. These innovations mean that healthcare no longer needs to be tied to specific locations, helping to solve long-standing access challenges. Improving a population's health is one of the main drivers of national development. That's why it's essential for countries like Iran to use the right technologies to boost their health indicators and overall well-being. This is the motivation behind this study: to explore how new technologies and technical know-how can help solve real problems in Iran's healthcare system—especially through the pharmaceutical sector. In the past, it was often assumed that if something worked in a developed country, it would work just as well in a developing one. But by the 1970s, it became clear that introducing complex, high-cost technologies without considering local conditions often made problems worse. Today, experts stress the importance of tailoring technology transfer to each country's social and economic realities. The pharmaceutical industry is vital—not just in Iran but around the world. Technology transfer here means moving discoveries from the lab to full-scale production and market use. For this to succeed, the knowledge involved must be well-organized, shareable, and have clear goals. This research aims to identify the real-world factors that make technology transfer work in Iran's pharmaceutical industry—so it can play a bigger role in improving health and advancing national progress.

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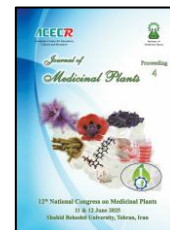
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Oral Presentation ID: 1477

Polyphenolic and antioxidant compounds are extracted and purified from olive waste products using macroporous resins, which provide high selectivity in separating specific phenolic compounds

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ARTICLE INFO	ABSTRACT
Keywords: Polyphenols Olive Pomace Resin-Based Extraction Sustainable Valorization Natural Antioxidants	The extraction and purification of polyphenolic compounds from agricultural by-products, particularly olive pomace, have gained significant attention due to their antioxidant, anti-inflammatory, and antimicrobial properties. Among various techniques, resin-based separation has emerged as an effective method for isolating and concentrating these bioactive molecules. Macroporous resins, exhibit excellent adsorption capabilities for polyphenols, allowing efficient fractionation and purification (1). Molecularly imprinted resins provide high selectivity in separating specific phenolic compounds like hydroxytyrosol and oleuropein, enhancing their bioavailability for pharmaceutical and food applications (2). In this study the extract derived from olive oil waste was enriched for major phytochemical components using macroporous resins. An HPLC method was developed to separate the phytochemicals in both the crude and partially concentrated extracts. Among the tested resins, LXA818 demonstrated the highest efficiency in the enrichment and purification process. Optimization of polyphenol adsorption and desorption under both static and dynamic conditions was conducted following resin selection. In the following, key parameters, including resin type, sample loading concentration, adsorption/desorption durations, and solvent conditions, were systematically optimized. These optimizations resulted in a reproducible and efficient protocol for recovering polyphenols, in agreement with earlier reports on the performance of macro-porous resins. HPLC-MS/MS analysis revealed notable differences in chemical composition between crude and enriched fractions, with Oleuropein, Tyrosol, and Hydroxytyrosol identified as the predominant compounds.

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Measuring allometric ratios of plant secondary metabolites as an effective technique and innovative approach for auditing experimental variables in various medicinal plant studies

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ARTICLE INFO

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Allometric ratio
Metabolic proportion
Secondary metabolite
Dependent variables
Independent variables

ABSTRACT

This research introduces a novel methodology for auditing experimental variables by analyzing allometric ratios of plant secondary metabolites (meaning the proportion between two metabolite-dependent variables in response to the application of independent experimental variables). This study suggests that the innovative use of allometric measurements and ratios of plant secondary metabolites is the best method to evaluate the effects of different treatments on determining the growth and development rate and phytochemical and ecophysiological performance of medicinal plants. Traditionally, allometric relationships have been employed primarily to evaluate plant growth and development; however, this research expands their utility to encompass the quantitative and qualitative assessment of genetic and environmental modifications affecting growth, phytochemical treatments, and other independent experimental variables. The authors identify two principal applied techniques derived from their review of existing literature. The first technique involves utilizing the allometric ratio of specific phytochemical components to one another, which is exemplified by the allometric ratio of menthol and menthone to pulegone for evaluating the quality of *Mentha piperita* L. [1]. The second technique focuses on the allometric ratio of a particular phytochemical component to the overall phytochemical function of the plant, such as the interaction of monoterpenes with sesquiterpenes relative to total essential oil in *Lippia citriodora* H.B.K. [2], or the ratio of camphor to total essential oil in *Artemisia sieberi* Besser, [3] to assess biodiversity. This study highlights the potential of allometric ratios of secondary metabolites in medicinal plants as a critical measure for evaluating the influence of independent variables in medicinal plant research. By incorporating this methodology into experimental frameworks, researchers can improve data reliability, thereby enhancing conservation and utilization strategies for medicinal plants. The authors assert that employing allometric ratios can significantly reduce experimental errors and enhance accuracy in phytochemical and biological experiments involving medicinal plants.

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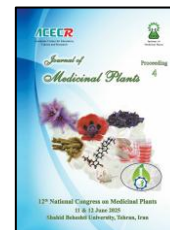
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Oral Presentation ID: 1317

Eucalyptus globulus the Wrongest Botanical Name Used in Iran

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ARTICLE INFO

Keywords:

Eucalypt

Eucalyptus

camaldulensis

Eucalyptus globulus

ABSTRACT

Since the scientific name of *Eucalyptus globulus* has been mistakenly used instead of *Eucalyptus camaldulensis* in many research and extensional articles, particularly in the fields of pharmacy, medicine, and plant-animal pests and diseases, the author, drawing on his significant research background in conducting eucalypt species trials in Iran, has attempted to clearly illustrate the differences between the two mentioned species in order to prevent this serious scientific error. More than 90 percent of the articles presented by the Iranian Scientific Information Database in relation to *E. globulus* are not correct. In this article, the differences are explained in botany, wood science, forestry, and forest ecology point of view. The species *E. globulus* is only available in experimental stations located in Caspian Sea plains as individual trees, but *E. camaldulensis* is widely cultivated in Iran, particularly in temperate and subtropical lands. The two species can be easily distinguished by their inflorescences and fruits as follows. ***E. globulus***: inflorescence is simple, axillary, usually 1-flowered, occasionally 3, with 4 (or occasionally more) very distinct ribs. Buds more or less turbinate, extremely pruinose; opercula flattened with a very distinct central knob, very warty. Fruits pedicellate, truncate-ovoid to cupular, thin-walled, 0.4-0.7 × 0.4-0.6 cm; disc broad, steeply descending, almost obscured by the 3 or 4 valves which vary from slightly enclosed to slightly exserted. Seeds ovoid, sometimes pointed at one end, grey, black or brown, ***E. camaldulensis***: inflorescences is simple, axillary, 7 to 11-flowered, opercula variable, beaked or rostrate, or conical, hemispherical, or hemispherical-apiculate, or horn-shaped. Fruits pedicellate, ovoid or globose (including the disc), 0.3-0.6 (hypanthia only) × 0.4-1 cm; disc broad, ascending; valves (3)4(5), robust, strongly exserted, seeds cuboid, yellow, yellow-brown, except var. *acuminata* which are mixed with black seeds.



Eucalyptus globulus

Bud



Fruit



Eucalyptus camaldulensis

Buds



Fruits

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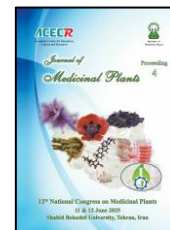
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The Problems Arising from Matching the Ancient Names of Medicinal Plants

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ARTICLE INFO

Keywords:

Medicinal Plants
Botanical knowledge
Scientific names
Islamic medicine

ABSTRACT

With the advancement of botanical knowledge and familiarity with the scientific names of plants based on the Linnaean method, those interested in ancient medicine have taken steps to update the knowledge of traditional and herbal medicine, and this has led to the emergence of many problems, of which I will mention a few.

- During the Islamic era, significant efforts were made to translate the surviving material from Dioscorides in the book *Materia Medica*, and attempts were made to translate Greek medicine into Islamic medicine (Arabic). However, due to the lack of sufficient knowledge and lack of knowledge of the plants introduced in Dioscorides' book, many unknowns remained. Most traditional medicine doctors, by following the first translators of Dioscorides' book and adding personal information to it, have caused the disorganization of traditional medicine knowledge in the present day.

- Inability to translate correctly and on a consistent basis. In many cases, they Arabized the Greek name and then chose the genus name and sometimes the species name for a plant. In the case of similar names, they introduce them with the first and second or other titles. In some cases, they introduce two completely different plants with the same name. In addition, to Arabize and adapt the names of the introduced plants, due to lack of familiarity with botanical knowledge, they have used the scientific name of the genus of one plant to introduce another plant that has no connection with each other.

- In addition to the translations of Dioscorides' work into Arabic, Latin, and other modern languages, considerable efforts have also been made to translate the books of famous people such as Abu Rayhan al-Biruni, Zakaria al-Razi, and Abu Ali Sina into Persian, or, according to the transcribers, attempts have been made to make Abu Ali Sina's writings more eloquent and to write their own marginal notes on them, which in this case has only caused more problems. It seems that the results of all those studies can be seen in the book *Makhzan al-Adawiya* by Aghili Khorasani, which is one of the authoritative references in the hands of those interested in traditional medicine in Iran. However, the existing problems

- The translators were not botanists, and even if they were, due to the lack of mass communication, they knew very few of the plants around them, and they did not believe in describing them as accurately as possible to transfer knowledge to others.

- Lack of a common language for translating texts and lack of knowledge of plant organs, so that in most cases only the plant's habitat or the organ used by the plant is mentioned, and a specific distinguishing feature for the plant name is not mentioned in the texts, except in a few cases, such as the shape of the root, the leaf (not describing the leaf but comparing it to another leaf, the lack of difference between a compound leaf and a simple leaf), the color of the flower, and the variety of hairs.

- Using animal organs to describe plant organs.

- The existence of several names for a plant

- The existence of names without botanical characteristics

- The existence of different names for plants with the same scientific name, sometimes based on the genus name, sometimes on the species name *Achilles Achillea fragrantissima* and *Aghiratr* for *Achillea ageratum*

- The existence of superstitions in traditional medicine books, including in the book *Makhzan Al-Adiwiyya*: for example, *tarragon*



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Oral Presentation ID: 1213

***Ocimum kilimandscharicum*; source of linalool and camphor, a suitable plant for Khuzestan Province**

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ARTICLE INFO

Keywords:

Antibacterial
Essential oil
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ABSTRACT

Ocimum kilimandscharicum plant is a shrub of the medicinal plants of the Lamiaceae family that grows in tropical and subtropical regions [1]. The plant is very useful in terms of therapeutic potential and has many medicinal properties such as relaxing, anti-Alzheimer, anti-inflammatory, sedative, treatment of cold, cough, and bronchitis [2]. In order to investigate the seasonal changes of secondary metabolites and antibacterial properties of the plant in Ahvaz weather conditions, fresh and dry plant yields, leaf gas exchanges, chlorophyll pigments, essential oil and phenolic compounds were evaluated during the year. Results showed that the amount of measured traits was different in different months of harvest. The highest plant yield of fresh and dry samples was recorded in June. Also, the highest rate of net photosynthesis was observed in April. The essential oil content of *Ocimum kilimandscharicum* plant was ranged 0.1-0.59% for fresh samples and 0.79-3.11% in dry plant samples. The highest phenolic compounds, flavonoid and antioxidant compounds was obtained in April (150.03 mg /g), November (10.52 mg /g) and July (100%), respectively. The main compounds of essential oil were linalool, camphor, 1,8 cineol, limonene and alpha-terpineol. Results of antibacterial test showed that the essence of the four seasons of the year inhibited the growth of all four types of bacteria and formed a halo of non-growth. Also, the essential oil of the plant samples in the spring and winter seasons inhibited bacteria growth better than the other two seasons, However, despite the fact that the best plant performance was recorded in June, the harvest of the plant with different goals is possible in different months of the year.

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Antidepressant, Anxiolytic and Hypnotic Effects of *Sambucus ebulus* L. Extract

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ARTICLE INFO	ABSTRACT
Keywords: <i>Sambucus ebulus</i> Antidepressant Anxiolytic Hypnotic	<i>Sambucus ebulus</i> L. (<i>S. ebulus</i>) is a well-known traditional Persian medicinal plant with various biological properties. However, the effect of <i>S. ebulus</i> extract on regulation of central nervous system is not well studied. Therefore, the present study aimed to evaluate the antidepressant, anxiolytic and hypnotic potential of <i>S. ebulus</i> extract in male mice. To study the pharmacological effects of <i>S. ebulus</i>, the plant was collected and the ethanolic extract of the aerial parts of <i>S. ebulus</i> was prepared for further investigations. The forced swimming test was performed to appraise the antidepressant effects of the extract. Also, the elevated plus maze and open field test were used to assess the anxiolytic activity, while pentobarbital-induced sleeping test was used to evaluate the hypnotic potential of the ethanolic extract. These tests were performed on NMRI male mice weighting 18-25 g. The animals were treated intraperitoneally with 4 different doses; i.e., 50, 100, 200, and 400 mg/kg of the ethanolic extract. According to the results of forced swimming test, at the doses of 100 and 200 mg/kg, the extract significantly decreased the immobility time comparable to fluoxetine (positive control). In the elevated plus maze test, the plant extract showed a significant effect at the dose of 200 mg/kg. Furthermore, the extract meaningfully reduced the total distance moved by the mice at the doses of 200 and 400 mg/kg in the open field test. Additionally, the ethanolic extract significantly increased the loss of righting reflex time at the doses of 200 and 400 mg/kg in hypnotic test. In conclusion, the ethanolic extract of <i>S. ebulus</i> showed antidepressant, anxiolytic and hypnotic activities in mice. Nevertheless, it is essential to isolate the plant extract and identify the main mechanism of subsequent effects by means of further investigations.

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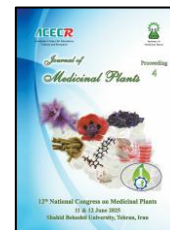
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Development of practical medicinal plants across various regions of Kohgiluyeh and Boyer Ahmad provinces, a strategy suited to both the climate and market demands

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ARTICLE INFO

Keywords:

Medicinal plants
Kohgiluyeh and Boyer-Ahmad
Ecological conditions
Sustainable development

ABSTRACT

Kohgiluyeh and Boyer-Ahmad Province, with its diverse climate, abundant natural resources, and extensive history of utilizing medicinal plants, holds significant potential for the sustainable development of these plants. Achieving this necessitates careful and informed planning that considers both ecological conditions and market demands. Therefore, this study was conducted to identify key medicinal plants across various regions of the province. The necessary data were gathered from the statistical population, which included active apothecaries in eight cities (40 trade units), medicinal plant producers (22 individuals), specialists (20 individuals), and experts (40 individuals) through a questionnaire. Using the Cochran formula, the sample size for each group was determined, and sampling was conducted using the snowball method. The validity of the questionnaire was assessed through content validity, while its reliability was evaluated using Cronbach's alpha. The results indicated that in the apothecaries of various cities in Kohgiluyeh and Boyer-Ahmad provinces, there are 201 plants or plant products with diverse medicinal, industrial, and edible uses. Plants such as *Carum carvi* L., *Foeniculum vulgare* Mill., *Cinnamomum zeylanicum* Blume, *Zataria multiflora* Boiss., *Rosa damascena* Herm., *Allium hirtifolium* Boiss., *Anthemis cotula* L., *Trigonella foenum-graecum* L., *Symbrium sophia* L. (formerly *Descurainia sophia*), *Anchusa ovata* Lehm., *Lippia citriodora* L., *Lavandula angustifolia* Mill., *Rachyspermum copticum* (L.) Link, *Nigella sativa* L., *Hibiscus sabdariffa* L., *Lawsonia inermis* L., *Myrtus communis* L., and *Kelussia odoratissima* Mozaffarian are the most frequently used in various cities and rank among the top priority plants. From the perspective of experts and specialists, priority plants for cultivation and habitat development in the natural and agricultural areas of cold regions include *A. hirtifolium*, *K. odoratissima*, *Ferula assa-foetida* L., *Ferula gummosa* Boiss., *R. damascena*, and *A. ovata*. In tropical regions, priority species comprise *L. citriodora*, *H. sabdariffa*, *L. inermis*, *C. carvi*, *Allyssum minus*, and *S. sophia*. A significant agreement is noted between the views of experts and the priority species identified by perfumers, particularly regarding *A. hirtifolium*, *K. odoratissima*, *R. damascena*, *A. ovata*, *L. citriodora*, *H. sabdariffa*, *L. inermis*, *C. carvi*, and *S. sophia*. Ultimately, selecting the appropriate medicinal plant for cultivation in each region necessitates careful consideration of ecological factors such as soil type, rainfall, and altitude. Additionally, it is crucial to evaluate the sales market and the requirements of the pharmaceutical and food industries to ensure the profitability and sustainability of cultivation.

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Recent Advances in Quality Control Methods for Herbal Driven Products and the Role of Artificial Intelligence in This Progress

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ARTICLE INFO

Keywords:

Quality control
Herbal products
Artificial intelligence
Analytical techniques

ABSTRACT

This oral presentation provides an in-depth review of the novelty and advances of quality control in herbal products, considering artificial intelligence's (AI) role in innovation and improvement in this area. Additionally, it highlights the integration of traditional knowledge and modern scientific approaches in achieving optimal quality control outcomes. With the rapid development of analytical techniques and the deepening understanding of the quality of natural herbs, increasing numbers of researchers have proposed many new ideas and technologies [1]. Therefore, i would discuss to explore novel evaluation methods suitable for the characteristics of natural medicines. On the other hand, AI is transforming quality control (QC) in herbal medicine by addressing challenges like adulteration, contamination, and standardization. It enhances precision, scalability, and compliance with global standards, bridging traditional practices with modern technology. Various machine learning models, such as supervised classification (SVM, Random Forest, k-NN), and deep learning (CNN for image analysis), are employed to analyze spectral data (e.g., UV-Vis, FTIR, NIR) or chromatographic data (e.g., HPLC, GC-MS) to identify chemical fingerprints. Multivariate analysis, combined with ML algorithms, can predict the quality of herbal medicine based on complex datasets generated from various types of spectroscopic and chromatographic analysis [2]. As a result, as analysis techniques continue to advance, the integration of AI into various aspects of the herbal product industry will undeniably drive innovation, improve quality control outcomes, and reshape the future of herbal products.

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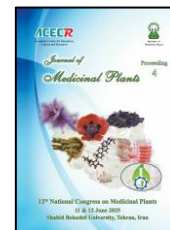
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Oral Presentation ID: 1301

From Seed to Remedy: AI Transforming Medicinal Plants

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ARTICLE INFO	ABSTRACT
Keywords: Artificial intelligence Machine learning Deep learning Medicinal plants Industrial applications	The combination artificial intelligence (AI) has with medicinal plant technologies is changing the pace of how we decipher, exploit and industrialize herbal remedies. As with other sciences and industries, AI is increasingly becoming an important technology of concern in the context of medicinal plants. In research, more sophisticated methods of machine learning and deep learning are being used. For example, deep learning models like Convolutional Neural Networks (CNNs) have shown great accuracy in distinguishing between plant species based on photographs (Dyrmann et al., 2016). The employing of machine learning techniques is growing to include predicting the concentration of useful secondary metabolites espoused to circumvent inconvenient chemical evaluations, employing Artificial Neural Network (ANN) for the analysis. AI also aids in the peripheral yet demanding task of genome, transcript, and metabolome charting information analysis, which provides a better understanding of the plant organism and its biological and medicinal qualities. In addition, the language processing plays an important role in systematic literature reviews and aids in searching and extracting useful compounds of text such as antidisease agents from massive amounts of documents (Afriantoni et al., 2024). AI algorithms have a strong impact on process optimization in the industrial sector. For instance, AI enhances the optimization of active compound extraction processes by parameter identification which can yield better processes and sustainability. AI applications are also being developed that assist with designing phytopharmaceutical formulations, which achieve optimization for efficacy, stability, and kinetics of drug release prediction. Automated quality control is another important area of application where AI is used. Computer vision and artificial intelligence are being applied for defect detection and inspection of products in real time. In addition, advanced analytics and recommender systems augment precision with other crucial business processes such as accurate demand forecasting, effective supply chain management, and dynamic marketing intelligence. In the case of Iran, there are some primary obstacles with regard to the application of AI for these problems such as absence of structured databases of medicinal plants, lack of cross-disciplinary specialists knowledgeable in AI and phytosciences, and poor computational facilities. Development of national data repositories of medicinal plants information is one of the hybrid researcher training proposals aimed at overcoming these obstacles.

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From Taboo to Health and Food Security: A Review of More Than a Decade of Cannabis Research and Development in Iran

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ARTICLE INFO	ABSTRACT
Keywords: Hemp Food security Regulations Artificial intelligence OMICS	<i>Cannabis sativa</i> L. is a high potential multipurpose annual plant grown in many parts of Iran since ancient times. Among more than 600 compounds in cannabis, the most important are cannabinoids, particularly CBD, CBG, and THC. Given its high economic value and diverse applications in the pharmaceutical, food, cosmetic-healthcare, fiber, textile, oil, and construction industries, research and commercial centers have long sought to disseminate and register their achievements in its multi-hundred-billion dollar market. Since removal of cannabis and cannabis resin from Schedule IV of the Single Convention on narcotic drugs, 1961, many countries have begun to review or redefine their laws to exploit cannabis. The multifunctional potential of <i>Cannabis</i> promises a bright future as a strategic and currency-generating plant for any country. Usually, after any change, when the emotions have subsided a bit, society goes back in search of balance and compensation, searching for resources it has forgotten, and "<i>Cannabis</i>" is an example of this. Due to the prohibition of marijuana which is completely distinct from the hemp and gap in public insight, cannabis cultivation has been banned or restricted in most countries for a long time, but now research and development on cannabis has become a priority for many countries. In Iran, relying on climate, rich elite germplasm, changing national and international laws and regulations, growing trend of the cannabis industry, and the establishment of the <i>Cannabis</i> Research Institute, effective measures have been taken to utilize high CBD varieties, which promises a bright future for the development of this industry in the country. These researches include genome sequencing of landraces and native chemotypes, integrated OMICS studies, profiling of cannabinoids and terpenes, in vitro propagation, development of artificial intelligence (AI) algorithms, breeding lines to introduce new varieties, <i>Cannabis</i> National Database (www.medcannabase.org), developing sex and type specific DNA markers, and cannabinoids impact on cancers, diabetes, MS, pain, and skin diseases.

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Oral Presentation ID: 1259

Standardization Protocols and Analysis Sheets for Registration of Natural Products: Ensuring Quality and Safety

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ARTICLE INFO

Keywords:

Standardization
Certificate of analysis
Natural products
Quality control
Microbial assessments

ABSTRACT

Background and Objectives: Natural products are integral to patient care, often used alongside conventional pharmaceuticals. Ensuring their quality and safety is essential for market entry, which hinges on the effective standardization of these products and the issuance of a detailed Certificate of Analysis (CoA). **Methods:** This analysis sheet serves as a comprehensive framework for evaluating product quality, adhering to established pharmacopoeial methods and proprietary laboratory techniques. Utilizing advanced chromatographic and spectroscopic approaches is critical for identifying and quantifying active ingredients in herbal formulations. Furthermore, potential contaminants—including microorganisms, heavy metals, and mycotoxins—pose significant risks to product integrity and consumer safety. Effective quality control measures must therefore encompass a range of methodologies that address physical, chemical, and biological parameters. **Results:** A thorough analysis sheet for natural products includes essential information such as the producer's name, laboratory conducting the tests, batch number, and manufacturing date. It details testing methods, specific product specifications, and the analysis date. Physical attributes—like appearance, color, aroma, viscosity, and density—are noted, along with critical chemical tests for active constituents, residual heavy metals, pesticide contamination, aflatoxin levels, and microbiological safety assessments. These assessments focus on total counts of aerobic microorganisms, molds, yeasts, and the absence of pathogenic organisms. **Conclusion:** The natural product analysis sheet encapsulates vital test results and evaluations, ensuring that products meet the established specifications. A product is deemed compliant and of high quality when all results fall within the defined acceptable limits.

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Phytochemicals in terms of Nutraceutical Importance

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ARTICLE INFO

Keywords:

Phytochemical
Nutraceutical
Phytonutrient
Functional foods
Medicinal plant

ABSTRACT

Nutraceuticals describe a new category that overlaps the line between drugs and food. These days, nutraceuticals and functional foods are used to provide health as well as medical benefits and have been introduced as a paradigm of proactive medicine. These products can be categorized into nutrients, dietary supplements, medicinal herbs and phytochemicals. Phytochemicals are bioactive compounds derived from plants and other natural sources like microalgae that maintain or promote health and arise at the intersection of the pharmaceutical and food industries. Recent studies have showed an association between the intake of phytochemicals such as carotenoids, phytosterols, polyphenols, flavonoids, dietary fibers, polysaccharides with their benefits in the prevention and/ or cure of diseases. These compounds possess antioxidant, antimicrobial, antiallergic, immunomodulatory, antispasmodic, anticancer, etc. activities. Some popular phytochemicals using as nutraceuticals include ginseng, echinacea, lycopene, polyphenols, green tea, curcumin, resveratrol, lutein, quercetin, astaxanthin and gamma-Linolenic acid. The prompt growth of phytochemicals application in nutraceutical necessitates the food and pharmaceutical industries to face new challenges; including in addressing public concern about their efficacy and safety, in government regulations for products containing these compounds, in the production of high quality and sustainable products, and in marketing issues. Overall, nutraceuticals is a nascent field, rising healthcare industry and rapidly emerging due to increasing consciousness of the potential profits of nutritional supplements to complement drug therapy and to improve significantly future therapeutics, but control over purity, efficacy, and safety is important and must be considered.

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Oral Presentation ID: 1575

The effect of lemon essence aromatherapy on anxiety and physiological indices in patient's candidate for lower extremity fracture surgery: A clinical trial

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ARTICLE INFO

Keywords:

Aromatherapy
Lemon
Vital sign
Anxiety
Fractures

ABSTRACT

Preoperative anxiety can lead to various challenges. Aromatherapy using lemon essence may alleviate certain complications. This study aimed to determine the effect of lemon essence aromatherapy on anxiety levels and physiological indices (systolic and diastolic blood pressure, pulse rate, respiration rate, and SPO₂) in patients who are candidates for lower extremity fracture surgery. This randomized clinical trial employed convenience sampling to recruit 90 patients referred to SUMS, who were subsequently randomized into control (n=45) and intervention (n=45) groups in 2021. The aromatherapy intervention commenced on the morning of the surgical procedure and extended through the operating and recovery rooms, continuing for 16 hours' post-surgery. Almond essential oil was administered to the control group. Data collection involved the Spielberger Inventory for anxiety assessment and a checklist of physiological indices. Data were analyzed using two-way repeated measures ANOVA. The study findings showed a significantly greater reduction in state anxiety levels in the intervention group compared to the control group (P<0.05). The utilization of aromatherapy with lemon essential oil resulted in a decrease in the state anxiety and an improvement in some physiological indices of the patients who underwent surgery for lower extremity fractures. Therefore, this complementary approach is recommended in conjunction with routine treatments.

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Poster Presentation ID: 1587

Targeted Profiling of Crocins and Picrocrocin in Iranian Saffron Using DESI-MS and LC-MS

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ARTICLE INFO	ABSTRACT
Keywords: Saffron DESI-MS LC-MS Crocins Qualitative analysis	Saffron (<i>Crocus sativus</i> L.) contains four major components: crocin, picrocrocin, crocetin, and safranal. Among these, crocin derivatives are the main bioactive compounds and serve as key indicators of saffron quality. Accordingly, the global market price of saffron is directly influenced by these quality assessments [1]. Desorption electrospray ionization mass spectrometry (DESI-MS), a pioneering ambient ionization technique, operates under atmospheric pressure with minimal sample preparation and is considered an efficient tool for optimizing time and human resources [2]. In this study, a qualitative and semi-quantitative method based on homemade DESI-MS was designed and optimized for the determination of crocins and picrocrocin in saffron from Razavi Khorasan Province, Iran. To evaluate the data obtained from the proposed technique, liquid chromatography-mass spectrometry (LC-MS) was employed, following a sample preparation process involving manual grinding, methanol addition, and subsequent filtration. The capillary and sample cone voltages (3800 and 35 V), the desolvation and source temperatures (350°C and 110°C), and the cone and desolvation gas flow rates (40 and 450 L/h) were set, respectively. The optimal DESI conditions in positive ion mode were investigated. Using the DESI-MS technique, diagnostic ions corresponding to crocin 1 (m/z 994 and 1015), crocin 2 (m/z 853), crocin 3 (m/z 691), and crocin 4 (m/z 527 and 543), and picrocrocin (m/z 369) were successfully detected in saffron samples. Unlike the LC-MS method, which requires an extraction process and the preparation of liquid samples, the DESI-MS technique enables direct sample analysis without any pretreatment. This method significantly reduces solvent consumption (by up to 50%) and shortens the analysis time to just a few seconds per saffron sample, making it a rapid and efficient tool for quality control applications.

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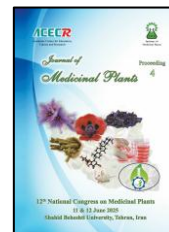
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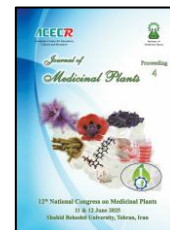
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Poster Presentation ID: 1001

Assessment of Genetic Diversity in Caper Populations Using Phytochemical Markers

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ARTICLE INFO

Keywords:

Antioxidant
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ABSTRACT

The caper plant (*Capparis spinosa* L.), a member of the Capparidaceae family, is a significant medicinal plant genus. Its flowers and fruits are highly prized in the food and pharmaceutical industries due to their rich flavonoid content, vitamins, and potent antioxidant properties. This species is widely distributed across Europe, Turkey, Iran, Russia, Afghanistan, Pakistan, and Iraq, with West Azerbaijan Province in Iran serving as a key biodiversity hotspot for this plant. This study focused on analyzing the phytochemical and antioxidant diversity of 20 *Capparis* genotypes from northwestern Iran. Key parameters such as total phenolic content, total flavonoid content, anthocyanin levels, ascorbic acid concentration, and antioxidant activity were evaluated. The results revealed that the average antioxidant activity, measured using the DPPH method, ranged from 41.63% to 66.20 %. Total phenolic content varied between 4.69 and 12.52 mg of gallic acid equivalent per gram of fresh weight, while total flavonoid content ranged from 1.39 to 3.60 mg of quercetin equivalent per gram of fresh weight. Anthocyanin levels were found to be between 3.38 and 8.5 mg/mL, and ascorbic acid levels ranged from 2.34 to 42.05 mg/100 g FW. A dendrogram generated using the Ward method categorized the samples into three distinct groups. Notably, samples collected from Noshin Shahr, Jamalabad, and Heydarlu exhibited particularly valuable traits. These findings suggest that these genotypes hold significant potential for breeding programs aimed at enhancing their bioactive properties. Further research could pave the way for the utilization of these genotypes in the development of pharmaceutical and food products, contributing to the advancement of these industries in Iran. This study underscores the importance of *Capparis spinosa* as a resource for natural antioxidants and bioactive compounds, highlighting its potential for future applications in health and nutrition.

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Effect of different drying methods on drying time and antimicrobial properties of *Ziziphus jujuba*

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Drying methods

Total bacteria count

ABSTRACT

Drying is the most common and fundamental method for fruit and medicinal plants preservation, which plays an important role in the quantity and quality of their effective substance [1]. *Ziziphus jujuba* Miller (Jujube) is a traditional herb with high pharmaceutical value. Jujube has many minerals and various vitamins. Most of the medicinal properties of jujube fruit are closely related to the antioxidant activity of flavonoids. Due to the short shelf life of fresh jujube and spoils after a few days, consumption of fresh fruit is low [2]. To find a suitable drying method to improve the storage and processing as well as preserve the nutrients and biological activity of jujube, four drying methods including drying in the shade, open sun, microwave (300, 600, 900 W), and oven (30 and 60°C) was used. The drying time (time required to reach 10% moisture) was measured in all methods. The survey results showed that microwave drying with output power 900 W at 9 min, spent less time than other drying methods. Also, increasing the temperature in the microwave and oven, caused a simultaneous decrease in drying time. The longest drying (17382 min) was achieved in shade drying. The results related to the investigation of total microbial count (Iran's National Standard, No.5272) by pour plate method (standard Plate Count Agar) showed that, the highest mean bacterial were found in control samples. Microwave drying had a significant effect on reducing the microbial load (<10cfu/g). This index value for the sun-dried samples (1.1×10^2 cfu/g) was less than other methods (except microwave).

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Colchicine effects on polyphenolic compounds accumulation in cell culture of *Catharanthus roseus* (Linn.) G. Don cultivars

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Keywords:

Autotetraploidy

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Phenolic compounds

In vitro culture

ABSTRACT

Catharanthus roseus G. Don) is a well-recognized herbal medicine with wide distribution, which attracted attention due to possessing a range of phytochemicals with various biological activities such as antioxidant, antibacterial, antifungal, anti-diabetic, and anti-cancer. Besides alkaloids, this plant produces a wide range of phenolic compounds [1]. Despite this plant's great medical and economic impacts, the study of polyploidy as a breeding method to increase the levels of desired compounds is low. Although there are previous protocols they may not be effective on different cultivars. [2]. *In vitro* seedlings of 'Red Really' and 'Polka Dot' cultivars (for the first time), were treated with different concentrations of colchicine for 24, 48 and 72 h. Chromosome counting and flowcytometry methods were used for assessing the ploidy level. Based on the results, colchicine concentration and treatment time and their interaction affected the tetraploid induction rate. Karyotype analysis demonstrated the diploid plants with $2n = 16$ chromosomes and tetraploids with $2n = 32$. Artificial ploidy manipulation caused significant changes in some phenolic contents in polyploids compared to diploids. In general, tetraploid plants had significantly accumulated a higher content of phenolic compounds. Furthermore, the cinnamic acid, apigenin, and quercetin increased by 38.2%, 33.4% and 18.9%, respectively, in "Polka Dot" tetraploid seedlings. On the other hand, the amount of caffeic acid, gallic acid, and chlorogenic acid increased by 17.3, 14.2 and 11.3% respectively in tetraploid plants of "Red Really". The results of this research will be used as a basis for further breeding programs on these high-yielding cultivars.

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Presentation and Explanation of a Simplified Practical Pattern Affected by the Outstanding Role of *Gundelia tournefortii* L. in its Major Habitats in Isfahan Province, Iran

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ARTICLE INFO	ABSTRACT
Keywords: Coordinate system Habitat desirability Phenological stage Seed Soil conservation	<i>Gundelia tournefortii</i> L. belongs to the genus <i>Gundelia</i> and the Asteraceae family [1,2]. This study was done to fulfill the providing a qualitative and quantitative pattern based on the prominent role of <i>G. tournefortii</i> L. in aspects of phytochemistry (seeds extract production during the phenological stages), habitat desirability (vegetation, climate, soil and physiography) and soil conservation (runoff generation and sediment yield affected by the rainfall simulator apparatus) in its major habitats in Isfahan province, Iran. Accordingly, the most important influential variables were selected in the habitats and a total of 22 variables were examined. In order to simplify the understanding of the relationships between the mentioned areas, a quantitative pattern based on scale-based scoring was designed using a specific quantitative range. At first, the phytochemical factor was placed in three qualitative and quantitative categories i.e. low (0–3), moderate (3–5) and high (5–10). Then, the habitat desirability factor was situated in three categories i.e. unfavorable (0–3), relatively favorable (3–5) and favorable (5–10). After that, the soil conservation factor was defined into three categories i.e. unsuitable (0–5), intermediate (5–7) and suitable (7–10). Following that, the separated habitats of <i>G. tournefortii</i> L. were drawn using Golden Software Grapher 3D software version 20.2.321 in the coordinate system in terms of spatial location. The results indicated that there is a close relationship between the yield of plant seed extract and the two aforementioned factors. It is also approved that the production of plant secondary metabolites is directly influenced by the ecophysiological characteristics in the study site.

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Poster Presentation ID: 1006

Habitat Potential Modeling of *Nepeta racemosa* In Iran and The Effect of Climate Change on Its Distribution

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ARTICLE INFO	ABSTRACT
Keywords: Climate change Maxent <i>Nepeta racemosa</i> Iran Future distribution	Species dispersion models attempt to define and outline the distinctive perspectives of climate change on the present and future species dispersion (1). The increasing rate of vulnerability and irreversible loss of natural habitats has reinforced the need to collect basic biodiversity data for conservation. The proper conservation and management of these species in the face of climate change and environmental threats is of great importance to meet future medicinal and economic needs(2). The genus <i>Nepeta</i> (Lamiaceae) is one of the nectar-producing species in Iran. In the present study, the potential distribution of <i>N. racemosa</i> was assessed using the Maximum Entropy Model (MaxEnt) and climatic variable to predict 2050 and 2080 situations for the impact of climate changes. An average of 16 general circulation models were used under optimistic (PCR 2.6) and pessimistic (PCR 8.5) greenhouse gas emission scenarios. 19 bioclimatic variables were used in this model. The results showed that isothermality (BIO3), average daily temperature range (BIO2), and average temperature in the driest season (BIO9) are among the most important variables affecting the distribution patterns of this species in Iran. In the overall performance evaluation of the model, the AUC value for the species <i>N. racemosa</i> was equal to 0.994, which indicates the excellent performance of this model. The results of modeling the distribution of this species under optimistic and pessimistic climate scenarios in the years 2050 and 2080 showed the negative impact of climate on the distribution of this species.

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Study of leaf micromorphology in *Melilotus* (Fabaceae) species in Iran

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ARTICLE INFO	ABSTRACT
Keywords: <i>Melilotus</i> Scanning Electron Microscope Leaf micromorphology Iran	The genus <i>Melilotus</i> L. (Fabaceae) includes annual and perennial herbaceous species distributed in different regions of Iran. These plants are rich in phenolic compounds and coumarins and are used in traditional medicine and pharmacy (1). In addition, they play an important role in soil improvement by fixing nitrogen and are used as green manure in sustainable agriculture. Some of its species are of high value in beekeeping due to their abundant nectar and contribute to the production of high-quality honey. This study aimed to investigate the micromorphological characteristics of the leaf surface in several species of this genus to identify the diagnostic characteristics. For this purpose, leaves collected from herbarium specimens and fresh samples were examined using scanning electron microscopy (SEM). Scanning electron micrographs of the leaves of the studied species showed that the leaf surface of <i>Melilotus alba</i> has stomata with medium density and relatively scattered trichomes with a relatively uniform cuticle. The species <i>M. indicus</i> has a higher stomatal density and its leaf surface has shorter and denser trichomes. <i>M. officinalis</i> has a different cuticle and denser trichomes. The different species studied showed significant differences in the stomatal density and arrangement, type and distribution of trichomes, and cuticular pattern. These differences can be used as additional criteria in distinguishing closely related species. The findings of this study indicate that leaf surface micromorphology can play an important role in taxonomic studies of this medicinal genus and help in better identification of its species(2).

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Poster Presentation ID: 1009

Investigation of the Antimicrobial Effect of *Myrtus communis* Essential Oil on the Standard Strain H37Rv and Clinical Isolates of *Mycobacterium tuberculosis*

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Medicinal plants
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ABSTRACT

Myrtus communis (Myrtle) is an evergreen shrub that grows wild in the plains of Asian countries, including Iran, as well as Mediterranean regions. The essential oil of this plant is used as a disinfectant due to its antimicrobial properties. In addition to its antiseptic effects, it is traditionally employed as a digestive tonic and for treating respiratory and urinary tract infections. The aim of this study was to evaluate the antimicrobial activity of *Myrtus communis* essential oil against the standard strain H37Rv and clinical isolates of *Mycobacterium tuberculosis*. The essential oil was extracted using a Clevenger apparatus, and its antimicrobial properties were assessed via the standard Kirby-Bauer disk diffusion method. The minimum inhibitory concentration (MIC) was determined against four different clinical isolates of *M. tuberculosis* in comparison with the standard H37Rv strain at four different concentrations. The study revealed significant differences in microbial growth inhibition across the tested concentrations. The minimum inhibitory concentration (MIC) of *Myrtus communis* essential oil against two bacterial strains was 7.5 mg/mL, while the minimum bactericidal concentration (MBC) was 15 mg/mL. The highest inhibitory concentration observed was 15 mg/mL, whereas the lowest inhibitory concentration was 3.75 mg/mL. For the standard H37Rv strain, the MIC and MBC values were 1.87 mg/mL and 3.75 mg/mL, respectively. The findings indicate that *Myrtus communis* essential oil has a significant inhibitory effect against *Mycobacterium tuberculosis*, suggesting its potential as a natural therapeutic agent for tuberculosis treatment. Therefore, the bioactive compounds present in this essential oil could be further explored for the development of novel anti-tuberculosis drugs.

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Effect of *Chlorella vulgaris* Extract on Yield and Essential Oil content of Spearmint (*Mentha spicata* L.)

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ARTICLE INFO	ABSTRACT
Keywords: <i>Chlorella vulgaris</i> <i>Mentha spicata</i> Essential oil Biofertilizer	Algal extracts, due to their bioactive compounds, play a significant role in enhancing plant growth and yield, making them a sustainable alternative in agriculture. This study investigated the effect of foliar application of <i>Chlorella vulgaris</i> microalgal extract on the yield and essential oil content of <i>Mentha spicata</i> in a randomized complete block design at the research farm of Shahrekord University. The algal extract was obtained using ultrasound-assisted extraction, and treatments included foliar spraying with 50, 75, and 100% extract concentrations, along with a control (distilled water), applied until full flowering stage. The results showed that the 100% extract concentration led to the highest biomass yield and essential oil content, with essential oil yield reaching 0.58 g/m ² and essential oil percentage 0.34%. In contrast, the lowest values were recorded in the control treatment (0.24 g/m ² and 0.18%, respectively). Moreover, treatments containing algal extract positively influenced plant growth and improved morphological traits, such as increased plant height, branching, and leaf area. These findings highlight the significant role of bioactive compounds, potentially including auxins and cytokinins, in <i>C. vulgaris</i> in enhancing secondary metabolite production and improving both quantitative and qualitative traits of essential oil. Overall, this study demonstrates that <i>C. vulgaris</i> microalgal extract, as a rich source of bioactive compounds, can serve as an effective and sustainable strategy for increasing the yield of essential oils in medicinal plants such as spearmint.

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Poster Presentation ID: 1011

The Effect of Passionflower (*Passiflora incarnata*) Extract On Anxiety In Ovariectomized Rats Suffering From PTSD

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ARTICLE INFO	ABSTRACT
Keywords: <i>Passiflora incarnata</i> Anxiety PTSD Ovariectomized Rat	Menopausal women make up a high percentage of the female population, and anxiety is one of the most common disorders during menopause. Anxiety is also a prominent symptom of post-traumatic stress disorder (PTSD). The effect of <i>Passiflora</i> extract on anxiety has been confirmed in previous research. The aim of the present study was to investigate the effect of <i>Passiflora</i> extract on anxiety in ovariectomized female rats with PTSD. Forty female rats were randomly divided into five groups of eight. The animals in the sham group, without ovariectomy, underwent only sham surgery and were given saline by gavage for one month, and then the elevated plus maze and open field tests were performed on them. The animals in the PTSD control group underwent ovariectomy and experienced a SPS model to induce PTSD and were gavaged with saline once a day, for one month. They were then subjected to the elevated plus maze and open field tests. The animals in the treatment groups experienced the same experimental procedures as the PTSD control group, with the difference that the animals were gavaged with <i>Passiflora</i> extract at doses of 30, 60, and 100 mg/kg. ANOVA for the percentage of open arms time and entries of the elevated plus maze showed that all groups spent a significantly lower entries and percentage of time in the open arms than the sham group. Treatment with extract did not significantly increase these factors compared to the control group. Analysis of the open field data showed that animals in the control group crossed the central square and performed grooming and rearing behaviors significantly less often than the sham group, which were improved by treatment with a dose of 60 mg/kg of the extract. Treatment with <i>Passiflora</i> extract may treat aspects of anxiety in menopausal women with PTSD.

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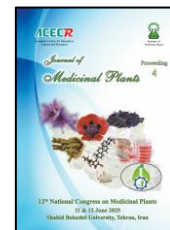
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The influence of *Zataria multiflora* essence on some growth parameters in calves

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ARTICLE INFO

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Zataria multiflora

ABSTRACT

This study aimed to explore the impact of injecting *Zataria multiflora* essence on growth performance and serum biochemical parameters in preweaning calves. Fifteen Holstein calves, aged 3-8 days with an average weight of 40.7 ± 0.70 kg, were randomly assigned to three groups: a control group receiving a placebo, a group receiving 100 mg/kg of *Zataria multiflora* essential oil (MZ100), and a group receiving 200 mg/kg of *Zataria multiflora* essential oil (MZ200) via injection. The growth performance, daily feed intake, blood parameters, fecal appearance consistency, and feces microbial population calves were assessed. The results of this study showed that the MZ200 group exhibited the highest feed consumption and body weight compared to the control ($p < 0.05$). Blood glucose concentration was highest in the control group and lowest in the MZ100 group 24 hours' post-injection and one month later ($p < 0.05$). Microbial population analysis revealed that the control group had the highest fecal *Escherichia coli* population, while the MZ200 group had the lowest ($p < 0.05$). The injection of 200 mg/kg of *Zataria multiflora* essential oil at birth appeared to enhance calf growth, improve feeding efficiency, and positively influence some blood parameters.



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Antimicrobial effect of *Origanum vulgare* L. essential oil

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ARTICLE INFO

Keywords:

Antimicrobial effect
Escherichia coli (*E. coli*)
Origanum vulgare L.

ABSTRACT

Background: One of the major causes of losses in livestock farms is the mortality and treatment costs, and reduced growth due to diarrhea in calves. Bacterial diarrhea caused by pathogenic strains of *Escherichia coli* (ETEC, EHEC, and EPEC) in calves, especially at birth, is important. *Origanum vulgare* L. is a plant from the mint family and applied to herbal medicine. Research has demonstrated its antibacterial activity against bacteria. **Objectives:** This research aimed to identify the molecular factors of *E. coli* isolated from calf diarrhea and to study the antimicrobial effect of *Origanum vulgare* essential oil. **Methods:** A total of 30 fecal samples were collected from calves exhibiting diarrhea across multiple industrial dairy farms in Semnan County. The samples were inoculated on MacConkey agar (Merck, Germany) and a single isolate from each sample was confirmed as *E. coli* through standard biochemical assays. All bacterial strains were subjected to multiplex PCR assays to detect the *Stx1*, *Stx2*, *eaeA*, and *hlyA* genes. MBC (minimum bactericidal concentration) and MIC (minimum inhibitory concentration) for *Origanum vulgare* essential oil samples were measured. **Results:** The PCR test results to determine the virulence genes of the isolates showed that of the 30 isolates examined, 11 isolates had at least one of these four virulence genes. Among these 11 samples, seven isolates had the *Stx1* virulence gene (63%), nine isolates had the *Stx2* gene (81%), four isolates had *eaeA* gene (36%), and seven isolates had the *ehlyA* gene (63%). For eight samples, the MIC result was 800 ppm, and for the remaining samples, the minimum inhibitory concentration was 400 ppm. The minimum bactericidal concentration (MBC) of the essential oil for the samples varied from 400 ppm to 1600 ppm. **Conclusion:** Among the 30 investigated isolates, 11 isolates had at least one of the four virulence genes. *Origanum vulgare* plant essential oil can be used in some infectious disease.



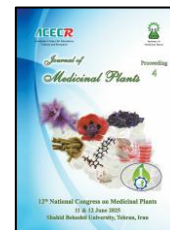
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Poster Presentation ID: 1016

Genetic and Morphological Diversity Assessment of *Sophora alopecuroides* Populations in Iran Using ISSR and SCoT Markers

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ARTICLE INFO

Keywords:

Genetic diversity
Molecular markers
Morphology
Sophora

ABSTRACT

Sophora alopecuroides is a perennial plant from the Fabaceae family that holds significant medicinal importance due to its bioactive compounds, particularly alkaloids. This study aimed to comprehensively assess the genetic and morphological diversity of different populations of *S. alopecuroides* in Iran. For the experiment, ten different ecotypes of the plant, collected from various climatic regions of the country, were used. To analyze genetic diversity, ISSR and SCoT molecular markers were employed, with ten primers from each marker group. Analysis of molecular variance (AMOVA) revealed that in ISSR markers, 67% of genetic variation was observed among populations, while 33% was within populations. In SCoT markers, these values were 49% and 51%, respectively, and in the combined analysis, they were 57% and 43%. The genetic structure analysis of the populations indicated genetic admixture among the ecotypes. The highest genetic similarity in ISSR markers was found between the Dizan Rud and Joustan populations, while in SCoT markers, it was observed between the Joustan and Maragheh populations. The Joustan population exhibited the highest polymorphism level, whereas the Seneghor population in ISSR markers and the Ashkezar population in SCoT markers showed the highest mean heterozygosity. In the morphological traits assessment, variance analysis indicated that most studied traits, except for a few such as stem type and leaf shape, were statistically significant at the 1% level. The data analysis demonstrated significant differences among populations in key traits, such as main stem length. Additionally, genotype environment interactions were found to be significant for most of the examined traits.

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Poster Presentation ID: 1017

Cytogenetic Analysis of Different *Sophora alopecuroides* Populations in Iran.

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ARTICLE INFO	ABSTRACT
Keywords: Centromeric index Cytogenetics Karyotype Sophora	<i>Sophora alopecuroides</i> is a perennial plant from the Fabaceae family, with 314 scientific names reported for this genus worldwide. Among them, 77 species have been recognized with accepted scientific names. In Iran, three species of this genus exist, including <i>Sophora mollis</i>, <i>S. pachycarpa</i>, and <i>S. alopecuroides</i>, along with a hybrid species (<i>S. pachycarpa</i> × <i>S. alopecuroides</i>). This plant holds significant medicinal importance due to its bioactive compounds, particularly alkaloids. This study aimed to investigate the cytogenetic characteristics of different populations of <i>Sophora alopecuroides</i> in Iran. Three ecotypes were collected from Karaj (Haljerd), Kermanshah (Sonqor), and Taleqan (Joustan). Five metaphase cells from each ecotype were analyzed. Cytogenetic studies revealed that all examined populations were tetraploid ($2n = 4x = 36$) with a basic chromosome number of $X = 9$. Based on centromeric index analysis, the karyotype formula of the populations was determined, identifying the Joustan population as symmetrical, while the Karaj and Kermanshah populations were classified as asymmetrical. The results showed no difference in chromosome ploidy levels among the examined ecotypes. However, variations in chromosomal indices indicate genetic structural diversity among the populations, highlighting the influence of environmental factors on cytogenetic traits. This finding suggests that cytogenetic differences between populations may be attributed to environmental adaptations and genetic variations.

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Poster Presentation ID: 1018

Improving Phenylethanoid Glycosides Production: The Impact of L-Tyrosine on Acteoside Synthesis in *Scrophularia striata*

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ARTICLE INFO	ABSTRACT
Keywords: <i>Scrophularia striata</i> Cell culture Acteoside L-Tyrosine	<i>Scrophularia striata</i> Boiss., an Iranian native plant, has been utilized as a folk remedy since ancient times. <i>Scrophularia</i>'s main bioactive ingredients are phenylethanoid glycosides (PhGs) [1]. PhGs are water-soluble phenolic compounds that have antibacterial, anticancer, antidiabetic, anti-inflammatory, anti-obesity, antioxidant, antiviral, and neuroprotective effects. Despite these promising effects, PhGs have failed to meet their therapeutic potential due to low bioavailability [2]. Attempts to better understand their metabolic processes in order to increase bioavailability are being researched. This study examined the impact of feeding precursor L-tyrosine on the growth, viability, and acteoside production in <i>S. striata</i> cell suspension culture. Samples were extracted using methanol %90 as a solvent. The isolated acteoside was analyzed by HPLC. Quantitative estimation of acteoside was done based on the peak area of specific concentrations of the sample and the standard. Results indicated that 3 mM L-tyrosine leading to a marked increase in acteoside synthesis ($18/80 \pm 3/01 \mu\text{g g}^{-1}$ cell fresh weight) which was 3.5-times greater than the untreated control at 12th day after treatment. These findings suggest that manipulating precursor availability could be a viable strategy for improving the production of PhGs in vitro, potentially paving the way for more effective therapeutic applications.

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Poster Presentation ID: 1019

Antimicrobial and synergistic comparison of *Vitis vinifera*, *Myrtus communis* and *Teucrium polium* with each other and with cloxacillin, vancomycin, gentamicin and tetracycline through disk diffusion and checkerboard assay method

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ARTICLE INFO	ABSTRACT
Keywords: <i>Myrtus communis</i> <i>Vitis vinifera</i> <i>Teucrium polium</i> Checkerboard assay Synergistic effects	Microbial resistance represents a significant global health challenge, undermining antibiotic efficacy while increasing mortality and healthcare expenditures. This study investigates the antimicrobial properties and synergistic interactions of Iranian traditional medicinal plants combined with antibiotics, employing disc diffusion and checkerboard methods. Methanolic extracts of <i>Myrtus communis</i> leaf and fruit, <i>Vitis vinifera</i> and <i>Teucrium polium</i> were tested. Cultures of <i>S. aureus</i> (ATCC 25923) and <i>E. coli</i> (ATCC 25922) (0.5×10^6 bacteria/mL) were prepared on Mueller-Hinton agar, with wells filled with 40 μL of extract (20 mg dry extract). To evaluate antimicrobial efficacy, the Minimum Inhibitory Concentration (MIC) has been determined using the serial dilution technique. Furthermore, Synergistic interactions were rigorously analyzed through checkerboard assay. This technique involved twofold serial dilutions in 96-well plates, incubated at 37°C for 24 hours, and quantified via ELISA reader absorption. Synergy was classified as Fractional Inhibitory Concentration Index (FICI) ≤ 0.5, partial synergy ≤ 1, and antagonism > 1. <i>Myrtus communis</i> leaf and <i>Teucrium polium</i> exhibited zones of inhibition (ZOI) of 37 mm and 33 mm against <i>S. aureus</i>, while <i>Myrtus communis</i> leaf and fruit produced ZOIs of 25 mm and 24 mm against <i>E. coli</i>. Notably, the combination of <i>Vitis vinifera</i> and <i>Myrtus communis</i> produced a 21 mm inhibition zone, compared to 16.5 mm and 8 mm individually. <i>Myrtus communis</i> leaf showing the most potent activity, achieving a MIC of 200 μg/mL against <i>S. aureus</i> and 3.2 mg/mL against <i>E. coli</i>. The combination of <i>Myrtus communis</i> leaf and fruit demonstrated the strongest synergy with a FICI of 0.25, while <i>Myrtus communis</i> fruit and <i>Teucrium polium</i> (FICI = 0.75) and <i>Vitis vinifera</i> with <i>Myrtus communis</i> fruit (FICI = 0.625) showed moderate synergy. In contrast, <i>Vitis vinifera</i> and <i>Teucrium polium</i> (FICI = 1.5) exhibited antagonism. These findings highlight the potential of plant-antibiotic combinations to combat resistance effectively.

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Poster Presentation ID: 1020

***Achillea eriophora* DC. from Spreading the Flood of Garebaigan Fasa: its Essential Oil Analysis and Polyphenolic Constituents**

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ARTICLE INFO

Keywords:

Achillea eriophora

Essential oil

Chemical composition

Phenolic compounds

Flood Spreading

ABSTRACT

Achillea eriophora belongs to the Asteraceae family and is native to Iran. This plant is one of the most important medicinal species of the genus *Achillea*, which has 6 native species in Iran [1]. Its highest distribution is in the southern provinces, especially Fars, and this species has a higher amount of essential oil (EO) compared to other species of this genus. The aim of this study was to investigate the chemical composition of EO and polyphenol content (PC) of *A. eriophora* in flood spreading conditions in Garebaygan, Fasa, located 50 km southeast of Fasa city in Fars province. The plant was harvested in the flowering stage in late May 2024. The EO was analyzed using gas chromatography (GC) and gas chromatography mass spectrometry (GC/MS) and PC identified with HPLC analysis. The content of EO was calculated based on the weight of the ground dry plant. The EO was pale yellow color at a yield of 0.2.25% (w/w). A total of 46 compounds that made up 99.78% of the total EO were identified. The results of this study showed that the main constituents of *A. eriophora* EO at the flowering stage were 1,8-cineole (30.2%), camphor (26.7%), α -pinene (7.1%), camphene (5.5%), β -pinene (4.5%), pinocarvone (3.6%), sabinene (3.5%), and borneol (2.4%) respectively. Eugenol (0.73 mg/g), thymol (0.72 mg/g), *trans*-ferulic acid (0.66 mg/g), rosmarinic acid (0.41 mg/g) and quercetin acid (0.33 mg/g) were the main PC in *A. eriophora* methanolic extract [2].

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Poster Presentation ID: 1022

Enhancing the Cosmetic Potential of Cranberry Seed Oil: Development of Nanoemulsion Powders for Improved Stability and Efficacy

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ARTICLE INFO

Keywords:

Cranberry
Nanoemulsion
Spraydrying
Cosmetic
Personal care

ABSTRACT

Cranberry seed oil, extracted from *Vaccinium macrocarpon*, is a potent source of fatty acids, antioxidants, and bioactive compounds [1]. However, its poor water solubility and limited skin penetration [2] necessitate nanoemulsification to enhance its bioavailability for cosmetic applications. This study developed cranberry seed oil-based nanoemulsions, which were subsequently converted into powders via spray-drying to improve stability and applicability in personal care products. Gas chromatography–mass spectrometry (GC-MS) analysis confirmed the oil's rich composition, identifying linoleic acid (C18:2) and α -linolenic acid (C18:3) as the dominant fatty acids, aligning with its well-documented antioxidant properties beneficial for skin health. Nanoemulsions were prepared using high-pressure homogenization, with cranberry seed oil as the oil phase, PEG4000, Tween 80, and Span 80 as emulsifiers, and an aqueous medium. Characterization revealed an average droplet size of 152 nm, a polydispersity index (PDI) of 0.11, indicating excellent uniformity and a zeta potential of -24.4 mV, suggesting good electrostatic stability. The nanoemulsion exhibited a pH of 5.8, which is ideal for skin applications, and an encapsulation efficiency (EE%) of 85%, ensuring effective retention of bioactive compounds. Stability tests demonstrated that the nanoemulsion remained stable for two months at 25°C, with no phase separation or significant changes in droplet size. Spray-drying transformed the nanoemulsions into powders, a process that enhances shelf-life and facilitates incorporation into dry cosmetic formulations. Scanning electron microscopy (SEM) analysis of the powders revealed spherical particles with an average size of 0.7–1.5 μ m. The powder exhibited a moisture content of 3.5%, ensuring long-term stability, and remained stable for three months under ambient conditions. Dispersibility tests demonstrated that the powder reconstituted in water within four minutes, forming a stable emulsion with a droplet size of 160 nm. This study highlights the potential of cranberry seed oil nanoemulsion powders as a sustainable cosmetic ingredient, offering moisturizing, anti-aging, and protective benefits through an innovative nanotechnology and spray-drying approach.

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Phytochemical Study and Biological Assays on *Cousinia harazensis* Rech. f. and *C. calocephala* Jaub. & Spach.

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ARTICLE INFO	ABSTRACT
Keywords: <i>Cousinia harazensis</i> <i>Cousinia calocephala</i> Anti-bacterial Anti-malarial Cytotoxicity	In this study, anti-bacterial, anti-fungal, anti-malarial and cytotoxicity effects by against five gram-positive and five gram-negative strains, one yeast strain and one string strain, Inhibition Test of Heme Detoxification and MTT cytotoxicity study is performed on four cell lines A2780, T-47D, A549 and Hep-G2. <i>C. harazensis</i> extract had an effect on all gram-positive strains (2). The best result related to the effect of this plant on <i>Streptococcus epidermidis</i> and in general the best effects of gram-negative bacteria is also related to this extract, especially against the <i>Pseudomonas aeruginosa</i>. The MIC of gram-positive and gram-negative bacterial growth also confirmed this trend but the bactericidal rate of gram-positive was the same for both extracts and bactericidal effect of <i>C. harazensis</i> against the gram-negative was better. The results of anti-fungal assay didn't show a growth inhibition zone but in terms of growth inhibition and fungicidal effect of <i>C. harazensis</i> against <i>Aspergillus fumigatus</i> is much better than other plant species. The study of the anti-malarial effect shows that these two plants are ineffective in this way. The trend of changes in cytotoxicity indicates the presence of cytotoxicity of <i>C. harazensis</i> on T-47D, A549 and T-47D with IC₅₀ of 32.21±8.58, 31.68±10.90 and 4.52±3.19 µg/mL, respectively (3). The effect of this plant on A2780 was transient proliferative. <i>C. calocephala</i> had a effect on cell line A2780 with EC₅₀ 8.03±4.49 µg/ml, a relative and transient proliferative effect on Hep-G2 and didn't show an effect on other lines. According to the better observed biological results of <i>C. harazensis</i>, a phenyl ester compound, two flavonoid, a sesquiterpene lactone and a phytosterol compound were isolated and the structure was determined by NMR and MS techniques.

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Poster Presentation ID: 1027

Identification of Ginger Essential Oil Components and Its Application in Aromatherapy

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ARTICLE INFO	ABSTRACT
Keywords: GC-MS Medicinal plant Volatile compounds <i>Zingiber officinale</i> Zingiberene	Medicinal plants have played a vital role in human health for thousands of years, serving as the foundation of traditional medicine and continuing to contribute to modern pharmacology. Their significance spans preventive, therapeutic, and holistic healthcare, offering natural alternatives to synthetic drugs with often fewer side effects. Ginger (<i>Zingiber officinale</i>) is one of the most important medicinal plants, and its essential oil has wide applications in medicine and aromatherapy due to its volatile and non-volatile compounds. Aromatherapy, as a complementary therapy, utilizes essential oils to enhance mental and physical well-being. Ginger essential oil, with its active constituents, has a notable impact on the nervous and immune systems. This study investigates the chemical constituents of ginger essential oil and its role in aromatherapy. Ginger essential oil was extracted via steam distillation from fresh rhizomes. Extraction efficiency was optimized based on temperature and time. Using gas chromatography-mass spectrometry (GC-MS), major components of essential oil were identified. The results showed that the main constituents of ginger essential oil were: Borneol (4.07%), α-Patchoulene (7.33%), γ-Curcumene (3.97%), α-Curcumene (15.99%), α-Zingiberene (7.66%), β-Bisabolene (6.22%), and β-Sesquiphellandrene (8.06%). Due to its active compounds like Zingiberene and shogaol, ginger essential oil is an effective option in aromatherapy. Ginger aromatherapy improved nausea and dizziness in chemotherapy patients' diffusers, stimulated the release of serotonin and dopamine, and relieved muscle pain through its warming properties in massage. Further clinical studies are recommended to determine optimal dosages and precise mechanisms of action.

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Poster Presentation ID: 1028

The impact of Climate change on the Geographical Distribution of Medicinal plants

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ARTICLE INFO	ABSTRACT
Keywords: Distribution Climate change Human activities Medicinal plants	Climate change has the potential to modify the geographical range of medicinal plants, thereby inducing their migration to areas with more favorable climatic conditions. While this may have the potential to expand the cultivation of medicinal plants, it also presents challenges in terms of sustainable production, land management, and preservation. Given the documented changes, it is imperative to develop and advocate for measures that can mitigate the impact of climate change on medicinal plants and ensure continued access to these resources. Habitat loss, excessive use, and destructive farming practices, among others, pose a threat to most medicinal plants. Climate change intensifies these threats by altering the ecosystems that support these plants, potentially leading to the extinction of species with unexplored uses. Medicinal plants are valuable species, but their geographic distributions may be limited or exposed to extinction by climate change. Therefore, research on medicinal plants in the face of climate change is fundamental for developing conservation strategies. Distributional patterns for a semi-endemic medicinal plant species, <i>Nepeta glomerulosa</i>, distributed in southwestern and central Asia showed that our findings can be used to inform conservation management programs for medicinal, endemic, and endangered species that probably respond similarly to climate change in southwestern and central Asia. Climate change ranks among the most powerful elements influencing future distributions of suitable areas for species. Human activities also have significant impacts on distributions of plants. We therefore recommend actions including conservation and local cultivation of valued plants, sustainability training for harvesters and certification of commercial material, preservation of traditional knowledge, and programs to monitor raw material quality in addition to, of course, efforts to mitigate climate change.

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Poster Presentation ID: 1029

Chemical Types of the Medicinal plant *Tanacetum polycephalum* in West Azerbaijan

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ARTICLE INFO	ABSTRACT
Keywords: Cluster analysis West Azerbaijan Esseintial <i>Tanacetum</i> <i>polycephalum</i>	Chemical composition of the essential oils of nine wild populations of <i>Tanacetum polycephalum</i> and Its relationship with geographical and ecological factors was investigated. The aerial parts of <i>T. polycephalum subsp. argyrophyllum</i> (C.koch.) were collected at full flowering stage from North, center and south of West Azerbaijan Province, air-dried; hydrodistilled and their essential oils were analyzed by GC-FID and GC-MS. A total of thirty compounds were identified accounting for 96.6-99.9% of the total oils. The most principal compounds were <i>trans</i>-thujone (0-79.8%), camphor (1.3-75.0%), 1,8-cineole (4.5-43.3%), borneol (1.0-36.2%) and bornyl acetate (0-26.8%). Hierarchical cluster analysis based on the percentages (>0.5%) of the essential oils compounds was carried out to determine the chemical diversity among the populations studied. According to the results, there is a relationship between the geographical location and the chemical composition of the essential oil and while the essential oils are very similar in populations of a local, there is a significant difference in the essential oils among the populations of different locals. Thus, geographical, climatic and ecological conditions have resulted in different essential oils of north, south and center locals of provinces. Therefore, it can be concluded that there are three main chemotypes namely: North type (camphor + 1,8-cineole), South type (borneol + bornyl acetate), and central type (<i>trans</i>-thujone).

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Molecular study of *Ferula assafoetida* medicinal species in North Khorasan province

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ARTICLE INFO

Keywords:

DNA
Nuclear
PCR
Sequencing

ABSTRACT

Ferula assafoetida, belonging to the Apiaceae family, is one of the most valuable medicinal species in Iran, with a long history in traditional medicine. Despite its medicinal and ecological importance, no comprehensive studies have been conducted on the molecular characteristics of this native species in its natural habitats in North Khorasan Province. The purpose of this study was to extract genomic DNA, perform sequencing, and conduct phylogenetic analyses using bioinformatics methods to determine the molecular position of this plant. First, samples of *F. assafoetida* were collected from natural habitats in Maneh and Semelghan city, North Khorasan Province. The collected samples, along with herbarium specimens of this species, were carefully studied and identified. DNA was extracted from their leaves using a kit, and its quality and quantity were assessed using a Nanodrop device. The DNA sequences were amplified using the nuclear marker nrDNA ITS via PCR for one to three samples per species. To evaluate the PCR results, the amplified samples were electrophoresed and the Single-band, clear, and smear-free PCR products were selected and sent to Codon Genetics Company for sequencing. For the analysis of molecular data, sequence alignment was performed using Clustal X and MUSCLE software. Phylogenetic tree reconstruction based on DNA sequence data was conducted using the maximum parsimony method in PAUP* software. The sequencing analysis led to the registration of the corresponding sequences in the GenBank database.

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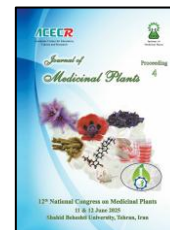
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Poster Presentation ID: 1031

The role of Sanyar prebiotic plant supplement in feeding common carp with emphasis in biofloc system

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ARTICLE INFO

Keywords:

Sanyar
Plant Supplement,
Stress
Common Carp
(*Cyprinus carpio*)

ABSTRACT

Today, the use of plant supplements has a significant role in reducing environmental stress in the aquatic environment and can have a positive effect on aquatic growth and resistance. The use of prebiotics and probiotics is an important group in this regard. Therefore, in this study, the effects of using prebiotic Sanyar on the metabolic activities of common carp (*Cyprinus carpio*) under the stress of fishing and transportation have been investigated. Diets containing prebiotic (0.1 and 0.2 g powder; FP1 and FP2) and (1 and 2 ml liquid, FL1 and FL2) and control group without additive (FC) in biofloc system and control group without additive with clean water (C) were fed to common carp for 60 days. At the end of the rearing period, to simulate catching stress, the fish were followed in the tanks with hand fishing nets for 10 minutes. For stress caused by long transportation with a stocking density of 1 kg (6 treatments and each with 3 replications), plastic bags (20 liters of water and 20 liters of oxygen) were used for 12 hours. After applying stress, blood sampling was done separately from the fish in two groups (catching and transportation). Cortisol concentration in the FC treatment (catch) and in the control treatment (transportation) had a significant increase compared to other experimental treatments. Red blood cells, hemoglobin and hematocrit had a significant decrease in prebiotic treatments under stress. In general, the results showed that the use of Sanyar commercial prebiotics in the biofloc environment reduces the stressful effects of catching and transportation for common carp.

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Poster Presentation ID: 1032

Effectiveness of Sanyar herbal supplement on digestive secretions of common carp fish

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ARTICLE INFO

Keywords:

Sanyar
Growth and Feeding
Water Pollution
Cyprinus carpio
Total ammonia
concentration

ABSTRACT

Prebiotics are indigestible substances that stimulate the growth and improve the health of the host by activating a set of beneficial bacteria in the digestive system. For this reason, additives that can reduce environmental stress and have positive effects on existing resistance are widely used. The present research was also carried out with the aim of investigating Effectiveness of Sanyar prebiotic herbal supplement on growth performance and reduction of organic load caused by carp feeding with emphasis on flock environment. Common carp (10.09 ± 0.45 g) were stocked into 18 tanks (35 L) in six treatments for 60 days, including: Control treatment without additive with clean water (C), Control treatments without additive with Floc (FC), Floc treatments with 0.1 and 0.2 g (FP1 and FP2) powder prebiotic and Floc treatments with 1 and 2 ml (FL1 and FL2) liquid prebiotic per 100 g of basic diet. Water parameters are maintained at the standard level for this species. Total ammonia concentration (TAN) was statistically significant between experimental treatments. The growth of fish was obtained significantly higher and the feed conversion ratio was lower in FP1. The highest intestinal protease activity (8.42 ± 0.05) was obtained in FP1 treatment. The immunoglobulin and lysozyme serum in FP2 and FL1 were significantly higher than in the other treatments. The results of this study show that the use of 0.1 g of Sanyar prebiotic powder per 100 g of basic diet in the biofloc system could improve growth performance, and the immune status of *C. carpio*.

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Poster Presentation ID: 1034

Autecology study of *Ferula assafoetida* medicinal species in North Khorasan province

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ARTICLE INFO	ABSTRACT
Keywords: Autecology EC Medicine plant pH	To optimize the utilization of rangeland ecosystems, it is essential to base rangeland management principles on ecological studies. This approach requires a comprehensive assessment of environmental parameters, analysis of ecosystem relationships, and the development of adaptive management strategies. Ecological studies serve as a scientific framework, enabling the design of a sustainable natural resource management system. <i>Ferula assafoetida</i> (known as "Anghouzeh" in Persian) is one of the most important rangeland plants, belonging to the Apiaceae family that has been used in traditional medicine since ancient times. Given the special status of this medicinal-industrial plant as an endemic species of Iran and its importance in both traditional and modern medical systems, it is noteworthy that no comprehensive studies have yet been conducted on the ecological characteristics of this valuable species in the ecosystems of North Khorasan Province, one of its major habitats. This research aims to fill this knowledge gap by examining the ecological parameters affecting the distribution of this species, including rainfall, temperature, EC, pH, and elevation. For this purpose, samples of this species and soil were collected from natural habitats in North Khorasan Province. The investigations revealed that the habitats of <i>Ferula assafoetida</i> have soils with a silty loam to silty clay and silty clay loam texture. The soil pH in the sampling range varied between 6.6 and 6.9, indicating the acidic nature of the region's soil. The standard deviation among the data suggests low variability in soil type in terms of pH. The EC of the soil samples ranged between 1.14 and 1.35 $\mu\text{S}/\text{cm}$. Statistical correlation analysis between pH and EC values ($p < 0.05$) showed a negative correlation between these two variables, meaning that as pH increases, EC decreases. <i>Ferula assafoetida</i> grows optimally in areas with an average annual temperature between 3.5 to 12 degrees Celsius, an absolute minimum temperature below -30 degrees, and an absolute maximum temperature of 40 degrees Celsius. Regions with an annual rainfall of 300-450 millimeters, where the majority of precipitation falls as snow, are suitable for this plant.

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Poster Presentation ID: 1035

Effect of *Catharanthus roseus* Leaf Extract on Mitotic Activity in *Allium cepa* Root Tip Cells

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ARTICLE INFO	ABSTRACT
Keywords: <i>Catharanthus roseus</i> <i>Allium cepa</i> Mitosis Alkaloids Polyploidy	<i>Catharanthus roseus</i> is a medicinal plant rich in antimitotic alkaloids such as vinblastine and vincristine. These compounds are known to interfere with cell division and may serve as natural alternatives to synthetic chemicals like colchicine in polyploidy induction. This study aimed to evaluate the effect of <i>C. roseus</i> leaf extract on mitosis in the root meristem of <i>Allium cepa</i>. Aqueous and ethanolic extracts were prepared from reproductive-stage leaves and applied at concentrations of 0, 0.2, 0.5, and 1% in a completely randomized factorial design. Parameters such as phase-specific cell counts, mitotic index, phase index, chromatid bridges, chromosome number, and multinucleated cells were assessed. The 0.2% aqueous extract showed the highest number of cells in prophase (26), while 0.5% ethanolic and 1% aqueous treatments completely inhibited mitosis at this stage. The highest metaphase, anaphase, and telophase frequencies were observed in the 0.5% aqueous treatment. The maximum prophase phase index (52%) was recorded at 0.2% concentrations of both extract types, while the lowest mitotic index (0.1%) occurred in the 0.5% ethanolic extract, which also showed chromatid bridges and multinucleated cells. Chromosome counts revealed 16 chromosomes, consistent with normal <i>A. cepa</i> cells, while nuclear abnormalities were mainly observed in ethanolic extract treatments. These findings indicate that <i>C. roseus</i> extract can disrupt mitosis in onion root tips, demonstrating its potential as a natural mitosis-inhibiting agent useful for inducing polyploidy in plant breeding programs.

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Evaluation of *Caroxylon vermiculatum* Essential Oil Composition as A Plant from The Irano-Turanian Region

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Keywords:

Salsola

Farnesyl acetone

Anti-bacterial

GC-MS

ABSTRACT

Salsola is one of the largest genera in the Amaranthaceae family (formerly Chenopodiaceae) and contains about 150–200 known species of annual, perennial, and shrubby plants (1). Nowadays, Some species of this family have transferred to other genus. *Caroxylon* is one of them that separated from the *Salsola* genus. *Salsola vermiculata* (Now *Caroxylon vermiculatum*) is a perennial plant with high salinity and drought resistance. This plant is used in desertification and soil stabilization projects and as livestock fodder in arid regions (3). Pharmacologically, *Caroxylon vermiculatum* contains several bioactive compounds, including alkaloids, flavonoids, saponins, and phenols, giving it various medicinal properties. Studies have shown that extracts of this plant have antioxidant, anti-inflammatory, and antibacterial properties (4). However, there are no studies on essential oils of this species. Aerial parts of *C. vermiculatum* were collected from Semnan Province, Iran. The essential oil of this plant was obtained by the Clevenger apparatus, and the constituents of essential oil were identified using GC-MS. The percentage of Farnesyl acetone and its derivatives was higher than others (60.5%), then geranyl acetone (7.2%) and 1,8-cineol (4.6%). Farnesyl acetone demonstrated pest control effects (7). Due to these effects and the enormous diversity of *Caroxylon vermiculatum* in Iran, this plant can play a vital role in Animal husbandry and agriculture in the future.

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Genetic and Phytochemical Diversity and Domestication Feasibility of Iranian *Grammosciadium platycarpum* Populations: A Rich Source of (S)-(+)-Linalool

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ARTICLE INFO

Keywords:

Linalool
Diversity
Phenolic compounds
Multivariate analysis
Domestication

ABSTRACT

Grammosciadium platycarpum Boiss. & Hausskn provides an abundant supply of essential oil with high (S)-(+)-linalool content [1]. (S)-(+)-linalool is a non-cyclic oxygenated monoterpene that is very useful and widely used in the cosmetic industries, especially in the production of perfume and cologne [2]. Therefore, due to the high commercial value and high demand, the search for new plant sources rich in (S)-(+)-linalool in agricultural systems to develop the business of this compound is of great interest. This investigation focused on the diversity of agro-morphological and phytochemical traits in *G. platycarpum* populations collected from fourteen geographical regions in Iran. The goal was to identify the essential compounds and select the best populations for domestication, cultivation, and future breeding programs. The highest coefficient of variation was observed in the umbrellas per plant, plant length, internode length, leaf width, number of lateral branches, and essential oil yield (EOY). The shoot dry weight was from 27.15 to 41.56 (g/plant) and the fruit dry weight was from 9.23 to 20.80 (g/plant) among different populations, which was observed in the QOR population. The fruit of the plant was used to extract and determine the content and constituents of the essential oil. The essential oil content (EOC) exhibited a extend from 0.81 to 1.63%. MAQ population showed the maximum and OSH population revealed the minimum EOC. The highest EOY (0.228 g/plant) was observed in the MAQ population and the lowest (0.083 g/plant) was related to the MAR population. Based on GC-MS and GC analysis, 91.97 to 99.93% of the crucial substance among different group of *G. platycarpum* were identified. Based on the results, linalool (65.90-81.62%), and limonene (9.73-15.34%) were the main ingredients of the essential oil profile. Rutin, ferulic acid, and chlorogenic acid were detected as the major phenolic compounds using HPLC. The high diversity observed among different populations of *G. platycarpum* provides good potential for selecting the best populations and using them in domestication projects, cultivation, and breeding programs.

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Poster Presentation ID: 1040

Investigation of Interaction Between Selenium Nanoparticles And Salinity Stress On Properties Germination and Growth of *Lallemantia iberica* L.

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ARTICLE INFO

Keywords:

Germination

Lallemantia iberica

Salinity

Selenium nanoparticles

ABSTRACT

Salinity is the main factor that decreases the crop productivity, yield losses and cause serious consequences for food security especially in arid and semiarid areas (1). *Lallemantia iberica* is an aromatic annual which is used to treat some neurological, liver, and kidney disorders (2). In order to investigate the interaction between the effect of selenium nanoparticle and salinity stress on urban Balangu (*Lallemantia iberica* L.), a factorial experiment based on a completely randomized design with 3 replications was conducted in the research laboratory of Azad University, Kermanshah branch. The studied factors include various salinity concentrations of 0, 2, 4, and 8 mM from the sodium chloride and the various selenium nanoparticle concentrations of 0, 10, 20, and 40 mg/liter from the selenium nanoparticle. The results of the comparison of the average interaction effect of selenium nanoparticle x salinity showed that under the influence of all salinity concentrations, with increasing concentration of selenium nanoparticle, percentage and germination rate, weight index of seed strength, seedling length, shoot length, radicle length and dry weight of balango seedlings increased. The lowest longitudinal index of seed vigor was related to the concentration of 8 mM salinity. which showed a decrease of about 70% compared to zero concentration. With the increase in the concentration of selenium nanoparticles, the longitudinal index of seed strength increased significantly. Also, the results showed that the longest shoot length (13.53 mm) was related to the interaction effect treatment of selenium nanoparticle (20 mg/L) x salinity (2 mM) while the lowest (2.2 mm) stem length was obtained under the influence of the interaction effect treatment of selenium nanoparticle (zero) x salinity (8 mM). The highest fresh weight of seedlings (641.30 mg) was obtained under the influence of 40 mg/liter selenium nanoparticle concentration. which compared to the zero concentration (531.40 mg) caused an increase of about 21% in the fresh weight of the seedling.

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Poster Presentation ID: 1042

Selenium Nanoparticles to Mitigate Cadmium Toxicity in Sage (*Salvia officinalis* L.)

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ARTICLE INFO	ABSTRACT
Keywords: Cadmium Heavy metal Abiotic stress Selenium Sage	Agriculture productivity and food safety are seriously threatened by heavy metal contamination, especially cadmium (Cd), which is particularly dangerous for aromatic and medicinal plants like sage (<i>Salvia officinalis</i> L.). Cadmium poisoning damages the quality and yield of essential oils, which are vital to the pharmaceutical, cosmetic, and aromatherapy industries, in addition to hindering plant growth and physiological functions. In order to mitigate Cd stress and improve plant resilience and productivity, creative and sustainable approaches are desperately needed. With an emphasis on their potential to reduce Cd-induced stress and enhance growth, biochemical characteristics, and essential oil profiles, this study examines the effects of foliar-applied selenium nanoparticles (Se NPs) on sage plants cultivated in Cd-contaminated soils. Our results show that Se NPs dramatically decreased the buildup of Cd in Sage plants' root and shoot tissues, showing decreases of up to 67% in the former and 45% in the latter when compared to untreated controls. By efficiently reducing Cd toxicity through foliar application of Se NPs at concentrations of 10-20 mg L⁻¹, plant growth parameters like shoot and root biomass, photosynthetic pigments, and relative water content improved. Furthermore, by raising the total phenolic and flavonoid content of sage plants which are essential in preventing oxidative stress brought on by heavy metals Se NPs improved the plants' antioxidative potential. The substantial increase in essential oil (EO) yield and content under Se NP treatment was one of the study's noteworthy results. Moderate Cd stress together with Se NPs caused the greatest EO yield with important constituents α-thujone, 1,8-cineole and camphor showing higher levels of production. Se NPs appears to condition the pathways of production of these bioactive compounds with the modification of the biosynthesis pathways suggesting additional uses related to drug and medicine.

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Clinical Effects of Medicinal Plants: An Evidence-Based Review

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ARTICLE INFO	ABSTRACT
Keywords: Medicinal Plants Clinical Efficacy Phytotherapy Randomized Controlled Trials Herb Drug Interactions	Medicinal plants have been integral to traditional medicine and remain relevant in modern clinical practice due to their therapeutic potential. This review evaluates the clinical efficacy, safety, and mechanisms of action of three widely studied medicinal plants <i>Curcuma longa</i> (turmeric), <i>Echinacea purpurea</i> (echinacea), and <i>Allium sativum</i> (garlic) based on evidence from human trials. A systematic literature search was conducted using PubMed, Scopus, and Web of Science (2015–2023), focusing on randomized controlled trials (RCTs) and meta-analyses. Turmeric's active compound, curcumin, demonstrated significant anti-inflammatory effects, reducing pain scores in osteoarthritis patients by 30% at doses of 500–1000 mg/day. However, its low bioavailability necessitates formulations enhanced with piperine [1]. Echinacea extracts, when administered within 48 hours of symptom onset, shortened the duration of upper respiratory infections by 1.8 days in RCTs, though efficacy varied with dosage and preparation methods [2]. Garlic supplementation (600–1500 mg/day) showed cardioprotective benefits, lowering systolic blood pressure by 5–10 mmHg and LDL cholesterol by 12 mg/dL in hypertensive patients [3]. Adverse effects were generally mild (e.g., gastrointestinal discomfort), but herb-drug interactions, particularly with anticoagulants, warrant caution. Despite promising results, heterogeneity in study designs, dosages, and extract standardization limits comparability. This review underscores the need for large-scale, long-term trials and standardized protocols to validate medicinal plants' therapeutic roles. Clinicians should consider these botanicals as complementary therapies while prioritizing patient safety through monitoring of interactions.

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Poster Presentation ID: 1045

Effect of *Vitex agnus-castus* Extract on Estrous Activity in Afshari Ewes

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ARTICLE INFO	ABSTRACT
Keywords: <i>Vitex agnus-catus</i> Estrous behavior Afshari ewe Reproductive hormones Phytotherapy	The present study aimed to evaluate the effect of <i>Vitex agnus-castus</i> (chasteberry) extract on the improvement of estrous activity in Afshari ewes. A total of 30 cyclic Afshari ewes, aged 2–4 years, were randomly divided into two groups (treatment and control). The treatment group received 500 mg/day of <i>Vitex agnus-castus</i> hydroalcoholic extract orally for 30 days, while the control group received placebo. Estrous signs were monitored daily and serum concentrations of reproductive hormones (estrogen, progesterone, LH, and FSH) were measured at the beginning and end of the trial. Results showed that the number of ewes exhibiting behavioral estrus was significantly higher in the treatment group compared to the control group ($P < 0.05$). Moreover, the levels of estrogen and LH were elevated, while progesterone was slightly decreased, indicating a stimulatory effect of the extract on estrous induction. These findings suggest that <i>Vitex agnus-castus</i> extract may have a positive impact on estrous synchronization and reproductive hormone modulation in ewes, possibly due to its dopaminergic and phytoestrogenic properties.

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Poster Presentation ID: 1046

Effect of *Foeniculum vulgare* Extract on Ovulation Rate in Estrus-Synchronized Ewes

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ARTICLE INFO	ABSTRACT
Keywords: Foeniculum vulgare Ovulation Estrus synchronization Ewes Phytoestrogens	This study was designed to evaluate the effect of <i>Foeniculum vulgare</i> (fennel) extract on ovulation rate in estrus-synchronized Afshari ewes. A total of 24 ewes were synchronized using CIDR for 12 days, followed by an intramuscular injection of 400 IU PMSG at CIDR removal. The treatment group (n=12) received 1 mL/kg BW of <i>Foeniculum vulgare</i> hydroalcoholic extract orally for 7 consecutive days starting at CIDR removal, while the control group (n=12) received distilled water. Ovarian activity was assessed 48 hours after PMSG injection using transrectal ultrasonography. Results showed that the number of corpora lutea was significantly higher in the fennel-treated group compared to control ($P<0.05$). Serum estradiol levels were also elevated in the treated group. These findings suggest that fennel extract, due to its phytoestrogenic compounds, may enhance ovulatory response in synchronized ewes and improve reproductive performance.

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Poster Presentation ID: 1047

Effect of *Calendula officinalis* Extract on Reproductive Performance and Ovarian Health in Dairy Cows

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ARTICLE INFO	ABSTRACT
Keywords: <i>Calendula officinalis</i> Reproductive performance Ovarian health Dairy cows Phytoestrogens	This study aimed to evaluate the effects of <i>Calendula officinalis</i> extract on reproductive performance and ovarian health in dairy cows. A total of 30 dairy cows were randomly assigned into three groups: control, low-dose (10 mg/kg BW), and high-dose (20 mg/kg BW) of <i>Calendula officinalis</i> extract. The extract was administered orally for 60 days. Ovarian function was assessed through transrectal ultrasonography, measuring follicular development, luteal body count, and ovarian volume. Serum concentrations of estradiol, progesterone, and luteinizing hormone (LH) were measured at regular intervals. The results showed that the groups receiving Calendula extract had significantly higher estradiol and progesterone levels compared to the control group ($P < 0.05$). Additionally, the number of corpora lutea was greater in the treatment groups. These findings suggest that <i>Calendula officinalis</i> extract, due to its phytoestrogenic and anti-inflammatory properties, can improve ovarian function, enhance reproductive performance, and promote overall fertility in dairy cows.

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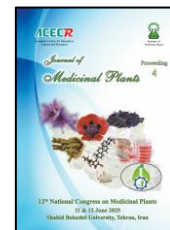
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Poster Presentation ID: 1049

Treatment of Panosteitis Using Ginger (*Zingiber officinale*) Extract in a German Shepherd Dog

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ARTICLE INFO	ABSTRACT
Keywords: Panosteitis Ginger Anti-inflammatory Dogs Treatment	Panosteitis, commonly referred to as "growing pains," is an inflammatory disease that primarily affects the fatty bone marrow, with secondary involvement of the surrounding bone. It is most commonly seen in young, large-breed dogs, such as German Shepherds, Great Danes, and Doberman Pinschers. The clinical signs of panosteitis can vary but typically include symptoms such as pain, lameness, lethargy, and swelling. In a recent case study conducted at the veterinary hospital of Urmia University, a two-year-old German Shepherd dog with symptoms of acute lameness in the forelimb was carefully diagnosed after a thorough clinical examination and radiographic evaluation. Although nonsteroidal anti-inflammatory drugs are commonly used to treat panosteitis, they can have potential side effects such as diarrhea, headache, and dizziness. Thus, a thorough consideration of alternative treatments was warranted. As a consequence, ginger extract was considered a treatment option due to its well-documented anti-inflammatory and analgesic properties, along with its rare side effects. After two weeks of medication with ginger extract, both the clinical symptoms and radiographic lesions were resolved, demonstrating promising results for alternative treatment. This study provides preliminary evidence that ginger extract may be a safe and effective alternative treatment for skeletal disorders in dogs, offering hope for improving the management of panosteitis in affected canine patients.

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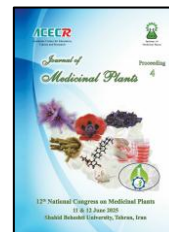
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Poster Presentation ID: 1050

Investigating the Role of Different Levels of Gibberellic Acid on Flowering of Evening Primrose (*Oenothera biennis* L.)

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ARTICLE INFO

Keywords:

Oenothera biennis L.

Gibberellic acid

Flowering

Rosette

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ABSTRACT

Evening primrose (*Oenothera biennis* L.), from the Onagraceae family, is a biennial plant that in first year, plant germinates and forms rosette leaves close to ground. In second year, produces a flowering stem that reaches a height of up to 1.5m (1). The regulation of various factors, including temperature and growth regulators, can affect flowering time of evening primrose. Gibberellic acid (GA) is a key plant growth regulator that affects stem elongation and flowering of rosette plants (2). In this regard, an experiment was conducted on a completely randomized design with the aim of investigating the effect of GA on the possibility of evening primrose flowering with 4 treatments (zero as control, 250, 500, 750 and 1000 mg/L) as foliar spray at the 2nd and 4th leaf stage and 5 replications, in research greenhouses of Shahrekord University. At the end of this experiment after 120 days, the condition of the plants was examined in terms of flowering time, flowering stem length and number of flowers. Statistical analysis was performed using Minitab software and comparison of means was carried out using the Tukey method. The results of the statistical analysis showed that effect of GA on all traits was significant at 1% confidence level. The shortest flowering time was observed in the 500 and 250 mg/L treatments, and no flowering was observed in control treatment. Also, the highest number of flowers was observed in the 500 mg/L treatment. The length of flowering stem in 500 and 1000 mg/L treatments was greater than the other treatments, and control treatment had the shortest height in the form of a rosette. GA can replace the cold requirement for flowering of rosette plants and, by inducing flowering and cell division, causes growth of flowering stem, formation of internodes, and premature flowering (2).

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Poster Presentation ID: 1051

Comparative Evaluation of Anthocyanin Content and Antioxidant Properties in Different Apple Cultivars

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ARTICLE INFO	ABSTRACT
Keywords: Pigment Free radical Bioactive Antioxidant activity <i>Malus domestica</i>	Apple (<i>Malus domestica</i> L.) is one of the most important sources of bioactive compounds with antioxidant properties that play a significant role in human health. This study aimed to investigate the anthocyanin content and antioxidant activity of four apple cultivars ("Golden delicious", "Red delicious", "Mashhad" and "Braeburn") in two parts of the fruit flesh and peel. The experiments were carried out using standard spectrophotometric methods and DPPH assay to measure the antioxidant activity. The results of analysis of variance showed that the effect of cultivar type, organ type (flesh or peel) and their interaction on anthocyanin content and antioxidant activity is significant at 1% level. The "Red delicious" cultivar has the highest anthocyanin content (8.283 mg.L⁻¹) and antioxidant activity (IC₅₀ =15.933 µg.mL⁻¹) while "Braeburn" cultivar had the lowest amount. Additionally, the fruit peel had a higher anthocyanin content than the flesh (7.45 vs. 5.80 mg.L⁻¹) and also had higher antioxidant activity. The interaction effect of cultivar and organ was also significant; the peel of the 'Red Delicious' cultivar exhibited the highest anthocyanin content and antioxidant activity. These results indicate the importance of selecting the appropriate cultivar and part of the fruit to harness the bioactive properties of apples. The findings of this research could contribute to the development of antioxidant-rich food products and improved pharmaceutical products.

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Poster Presentation ID: 1053

Comparison of Trans-Anethole Extraction Yield from Fennel Under Ultrasound Waves Using a Deep Eutectic Solvent and Ethanol

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ARTICLE INFO

Keywords:

Ultrasound extraction
Trans-anethole
Fennel
Deep eutectic solvent

ABSTRACT

Fennel (*Foeniculum vulgare*) is an aromatic medicinal plant with many medicinal properties. Trans-anethole (TAN) is the main bioactive compound in fennel seeds that exhibits potent antioxidant activity, antimicrobial, anti-inflammatory, antitumor, antidiabetic, and blood pressure-lowering effects. TAN is used in the perfumery, pharmaceutical, and food industries, including processed products, stuffings, food additives, food preservatives, and artificial flavors. Therefore, the appropriate extraction method of trans-anethole from fennel seed is important [1]. Novel environmentally friendly extraction techniques, such as ultrasound-assisted extraction (UAE) with green deep eutectic solvents (DESs), are replacing the conventional extraction methods with organic solvents. The significant advantages of DES compared to organic solvents are low toxicity, biodegradability, and no separating step required after the extraction process [2]. In the present study, synthesized DES of choline chloride-1,2-propylene glycol (ChCl-PG) at a 1:2 molar ratio was used for the UAE process of TAN. The UAE was performed at a power of 240 W, a particle size of 0.25 mm, and an extraction time of 34 min. Then, the extraction process TAN was performed with an ethanol solvent. The experimental data showed maximum extraction yields of TAN with DES (5.935 mg/g DW) compared to ethanol organic solvent (5.121 mg/g DW). These results present the ability of DESs as a green and highly efficient solvent for extracting bioactive compounds from medicinal plants. Therefore, this technique can be scaled up in industrial production by reducing process costs and maintaining the final product quality.

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Poster Presentation ID: 1054

Comparsion of antioxidant activities of extracts and gelatin capsules of *Cinnamon zeylanicum*

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ARTICLE INFO	ABSTRACT
Keywords: Cinnamon Antioxidant activity Encapsulation Gelatin Extract	<i>Cinnamon zeylanicum</i> is one of the cinnamon species of the Lauraceae family and, as a key ingredient in various spices, exhibits numerous medicinal properties, including antimicrobial, antifungal, anti-inflammatory, anti-tyrosinase, anticarcinogenic, and antimutagenic effects. This species contains various phenolic and flavonoid compounds in different parts of the plant, which play a major role in its antioxidant potential due to their significant structures and moieties. Aqueous and alcohol extracts from several cinnamon varieties (<i>Cinnamomum</i> spp.) are known to provide various health benefits, such as antidiabetic, antioxidant, and antimicrobial properties. Organic solvents have varying effects on human health; therefore, this study employed encapsulation as a method for solvent removal to encapsulate the ethanol and aqueous/ethanol extracts of <i>C. zeylanicum</i> using freeze-drying techniques. The prepared capsules were characterized using FESEM. The total phenolic content (TPC) of the extracts and capsules was determined, and the antioxidant activities of the samples were compared using DPPH and FRAP methods. The highest levels of TPC, DPPH, and FRAP were associated with the cinnamon aqueous ethanol capsule (88.70 ± 3.02 mg GAE/ g), cinnamon ethanolic extract (90.75 ± 0.69 %), and cinnamon ethanolic capsule (6.39 ± 0.66 mol FeSO₄/g), respectively. The results demonstrate the valuable application of encapsulation technology in the pharmaceutical and food industries.

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Poster Presentation ID: 1055

Creating Technical Knowledge of Preparing Industrial Propolis Extract to Use in the Tablets with Lowest Additives

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ARTICLE INFO

Keywords:

Technical knowledge
Propolis
Standardized extract

ABSTRACT

In the last decade, using herbal and natural medicines and products has increased in many countries. The effectiveness and therapeutic effect of herbal products is highly dependent on the quality of natural raw materials with effective ingredients in the right concentration, lack of microbial and chemical contamination, as well as other physical and chemical properties. [1]. The standardization of natural extracts verify its identity, quality, purity and applicability. Therefore, the reliable production process with high repeatability and evaluation of parameters based on chemical, physical and microbiological studies can act as an important tool in production studies and standardization of natural extracts. In this study, in order to produce and standardize the extract of propolis, the amount of effective substances (phenol and flavonoid) were determined in initial raw materials [2, 3]. All extraction steps from approved raw materials were investigated and optimized based on the amount of phenol and flavonoid, lack of microbial contamination, humidity and acceptable amount of wax. This extraction process comprises several steps, consisting of dewaxing, initial hydroalcoholic extraction based on the 70% ethanol from dewaxed raw propolis, followed by a series of extractions on the residue using an ethanol/ water mixture, with each extraction being carried out on the residue from the previous extraction using a higher percentage of ethanol. The influence of extraction temperature has also been studied. Elevated temperature resulted in shorter extraction times with water-ethanol mixtures. The optimal temperature for short extraction time and maximum yield of active constituents was found to be 70 °C. The humidity of the extract play an important role in the tablet physical properties so this factor was optimized at final step. Finally, by testing the obtained extracts, the best extract for tablet production, was selected in terms of all physicochemical properties. All physicochemical and microbial studies were conducted based on standard spectroscopic methods and other related standard methods in reliable references.

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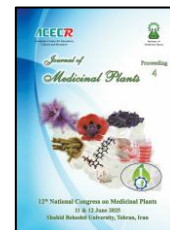
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Poster Presentation ID: 1059

Effects of *Hypericum perforatum* on Ketamine-induced Embryotoxicity and Pathospermia in Mature Male Rats

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ARTICLE INFO	ABSTRACT
Keywords: Ketamine <i>Hypericum perforatum</i> Sperm <i>In vitro</i> fertilization Rat	Psychoactive drugs abuse has become a public health concern. Accordingly, this study was implemented to unravel the effect of <i>Hypericum perforatum</i> (HP) on ketamine (KET)-induced embryotoxicity and pathospermia in mature male rats. Twenty mature male rats were randomly allotted to four equal groups including non-treated control group, HP control group receiving HP (Kneipp® Johanniskraut Dragees H; 100 mg/kg/day) orally (PO) for 14 days, KET group receiving KET (20 mg/kg/day; intra-peritoneally [IP]) for 14 days, and KET/HP group receiving KET (20 mg/kg/day; IP) plus HP (100 mg/kg/day; PO) for 14 days. Afterwards, epididymal sperms <i>in vitro</i> fertilizing potential, genetic integrity, and morphological abnormalities (teratozoospermia index [TZI]), <i>in vitro</i> embryo development, and testicular tissue oxidative stress index (TTOSI) were determined at the end of experimental period. The HP treatment led to the marked improvement in the epididymal sperms <i>in vitro</i> fertilizing potential and DNA integrity, and blastulation rate, as well as pronounced reduction in TTOSI and TZI compared to the KET group. Protective activity of HP against KET-elicited reproductive impairments in mature male rats can be associated to the testicular tissue anti-oxidant defense system reinforcement and oxidative damages alleviation regarding its potent anti-oxidative compounds function.

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Poster Presentation ID: 1060

Effect of Feeding Wild Rose (*Rosa canina* L.) Extract on Sperm Quality of Drone Honey Bees

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ARTICLE INFO	ABSTRACT
Keywords: Feeding Wild Rose (<i>Rosa canina</i> L.) Extract Sperm Quality Drone Honey Bees	Nowadays, special attention is paid to feeding honey bee colonies with medicinal plant extracts to ensure their survival and sustainability. However, limited studies have investigated the effects of such feeding strategies. This study was conducted to better understand whether feeding honey bee colonies (<i>Apis mellifera</i>) with hydroalcoholic extract of wild rose (<i>Rosa canina</i>) affects the sperm quality of drone bees. The experiment was carried out under natural conditions in an apiary located in Ardabil province. The experimental treatments included a control group and separate groups fed with 2%, 4%, and 8% concentrations of wild rose extract. The field operation lasted for 60 days during the spring season (30 days of feeding followed by 30 days post-feeding). At the beginning of the experiment, colonies were standardized based on population size, food reserves, and sister queens of the same age. To evaluate reproductive traits of drone bees, parameters such as sperm motility and viability, concentration, plasma membrane integrity, and apoptosis were measured. The results showed a significant increase in sperm motility and viability in drones fed with 4% wild rose extract. The integrity of the plasma membrane in the 2% and 4% extract groups was higher than in the other treatments ($P < 0.05$). Sperm concentration was significantly higher in the 4% extract group compared to the control. The percentage of spermatozoa exhibiting early apoptosis in the 2% group, and the percentage of spermatozoa undergoing complete apoptosis in the 2% and 4% groups, were significantly reduced compared to the control group.

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Poster Presentation ID: 1063

Encapsulation of aqueous and aqueous-ethanolic extracts of *Camellia sinensis* using a gelatin biopolymer

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ARTICLE INFO

Keywords:

Camellia sinensis
Antioxidant activity
Encapsulation
Freeze drying
Gelatin

ABSTRACT

Antioxidant activity is a substance's ability to prevent oxidation (free radical damage). Its relevance lies in mitigating oxidative stress, a key factor in pathologies such as atherosclerosis, neurodegenerative diseases, and cancer. However, clinical trials on antioxidant supplementation have yielded mixed results, highlighting the complexity of in vivo antioxidant actions and the importance of considering bioavailability and interactions with biological system (1). Encapsulation of bioactive compounds is a promising approach to enhance their stability and bioavailability. This study focuses on the encapsulation of aqueous and aqueous-ethanolic extracts of *Camellia sinensis* using a gelatin biopolymer. The primary objective is to compare the antioxidant activities of the prepared capsules with their respective free extracts (2). The encapsulation process was carried out using gelatin as the biopolymeric matrix, and the antioxidant activities were evaluated using DPPH and FRAP assays. The results demonstrated that encapsulated extracts exhibited enhanced antioxidant potential compared to free extracts, suggesting that gelatin encapsulation effectively preserved and possibly improved the bioactivity of polyphenolic compounds. These findings highlight the potential of gelatin-based encapsulation as a viable strategy for delivering plant-derived antioxidants in functional food and pharmaceutical applications (3). In the present study, the antioxidant properties of various aqueous and aqueous-ethanolic extracts will be examined and compared. Additionally, using the freeze-drying encapsulation method, high-efficiency capsules with a natural gelatin biopolymer coating will be produced (4). This approach aims to eliminate chemical solvents, facilitate the application of the active compounds of green tea in various industries, and enhance the stability of antioxidant compounds. Furthermore (5), the antioxidant activities of the extracts will be compared with those of the prepared capsules. These aspects will be investigated for the first time in the present study.

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Poster Presentation ID: 1064

Effects of gibberellic acid and cold stratification on seed germination and growth traits of *Grammosciadium platycarpum* Boiss. & Hausskn. Seedlings

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ARTICLE INFO

Keywords:

Cold stratification
Germination traits
Seed dormancy
Seed vigor index

ABSTRACT

Grammosciadium platycarpum Boiss. & Hausskn (Family ‘Apiaceae’) is a crop rich in essential oil and widely used in food and perfume industries [1, 2]. In order to evaluate different levels of gibberellic acid and wet chilling on germination and vigor of mountain dill seedlings, a factorial experiment was conducted in a completely randomized design with two factors: gibberellic acid (0, 300, 500, and 700 ppm) and stratification (0, 2, 4, and 8 weeks) in three replications. The results showed that with increasing the duration of stratification and increasing the concentration of gibberellic acid, the germination percentage, germination rate, germination rate index, seedling vigor, fresh and dry weight of the seedling improved and had a significant difference compared to the control. The highest germination percentage (94.66%), germination rate (90.66 seeds per day), germination index (5.2), seedling vigor (2325), fresh weight (1.51 g) and dry weight (0.41g) seedlings were observed in the combined treatment of 700 ppm gibberellic acid and stratification for 8 weeks. Also, the lowest mean germination time (1.6 days) was obtained in the treatment of 700 ppm gibberellic acid and 8 weeks of stratification, and the longest (6.93 days) was in the control. Therefore, the application of gibberellic acid and wet chilling, in addition to breaking dormancy and improving seed germination indices, can lead to improved growth by producing stronger seedlings and thus achieving optimal plant yield.

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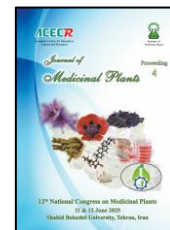
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Poster Presentation ID: 1065

Plant Density Effect on Forage Yield and Quality of Artichoke (*Cynara scolymus*) Under Conventional, Organic and Integrated Nutrition

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ARTICLE INFO

Keywords:

Artichoke
Forage crops
Biofertilizers
Medicinal plants
Plant nutrition

ABSTRACT

This study carried out on agronomic management of artichoke (*Cynara scolymus*) to create valuable information in sustainable management of the agroecosystems in Iran. Artichoke, a high yielding vegetative growth, is known around the world as a source of valuable phytochemicals such as chlorogenic acid, cinnarine and phenolic compounds. Therefore, it would be applied in livestock feeding as a forage-drug. In order to study the interaction between plant density (57, 67, 80 and 100 thousand plants per hectare) and nutrition system (conventional, organic and integrated) on biomass yield and artichoke forage value a field experiment was carried out in the Faculty of Agriculture, Tarbiat Modares University during the 2020-2021 growing season. Randomised complete block design with split plot arrangement of treatments was analysed with three replicates. During the two summer and autumn harvest (middle and end of vegetative growth period, respectively), biomass yield and forage value of artichoke arial parts were evaluated. Nutrition system had a significant effect ($P < 0.01$) on fresh and dry forage yield. The highest fresh and dry forage yield of 129.2 and 14.5 t. ha⁻¹, respectively, was obtained under chemical treatment. The integrated nutrition came in second place with production of 105.4 t. ha⁻¹ of fresh and 12.16 t. ha⁻¹ of dry forage. The effect of plant density was not significant. However, the highest density, including taller plants and the highest leaf area index, was superior for fresh and dry forage yield (101 and 11.1 t. ha⁻¹, respectively). Harvesting time of the artichoke vegetative body had a highly significant effect on all traits. The summer harvest (with 110 days of growth) accounted for the highest fresh and dry forage (108.5 and 11.9 t. ha⁻¹) respectively. In other words, the artichoke yield of the fall harvest, passing 55 days growth more than the summer harvest, showed 13 and 19.7 percent decreases in fresh and dry forage respectively. The integrated nutrition which reduced chemical fertilizer by 50 percent, appeared superior to nutrition system in many qualitative traits of artichoke forage, including DMD, WSC, CF, ADF, NDF and calcium. The increase in the vegetative growth period of artichoke from 110 to 160 days was accompanied by a decrease in the quality of the produced forage to some extent.

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Poster Presentation ID: 1066

Identification and Evaluation of Major Compounds in *Mentha aquatica* Essential Oil

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ARTICLE INFO

Keywords:

Mint
Carvone
Limonene
Anti-inflammatory

ABSTRACT

The genus *Mentha* (mint) is one of the important and medicinal genera of the Lamiaceae family, which includes various species worldwide. About 25 to 30 species of the genus *Mentha* have been identified globally. In Iran, eight native and introduced species of the genus *Mentha* have been identified (1). *Mentha aquatica* (water mint), as a member of the Lamiaceae family and *Mentha* genus, is found scattered in humid areas in Iran, especially along rivers, springs, and wetlands in the northern and western regions of the country (2). Aerial parts of *Mentha aquatica* were collected from Northern Iran and The essential oil of this plant was obtained by the Clevenger apparatus. The constituents of essential oil were identified using GC-MS. The Major compounds in the essential oil were Limonene (22%) and Carvone (51%). Limonene can protect cells against oxidative damage by reducing free radicals and demonstrates anti-inflammatory activity by inhibiting inflammatory pathways such as NF- κ B (3). Also, carvone is a keto monoterpene that demonstrated an antispasmodic effect, anti-bacterial, anti-fungal and anti-inflammatory activity by inhibiting inflammatory enzymes such as COX-2 (4). Due to these effects of *Mentha aquatica*, this plant can be introduced to control inflammatory diseases such as Rheumatoid arthritis, Ulcerative colitis, and autoimmune conditions.

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Poster Presentation ID: 1067

Reproductive Plasticity in White Flax (*Linum album* Ky. ex Boiss.): The Role of Flower Morphology and Pollination Methods in Seed Formation"

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ARTICLE INFO	ABSTRACT
Keywords: Flower biology Free pollination Pin Seed Thrum	White flax (<i>Linum album</i> Kotschy, ex Boiss.) is one of the valuable medicinal plants and an endemic species of Iran. The primary use of its secondary metabolites is the production of anticancer drugs. Understanding the flower structure and studying the interaction between different reproductive systems in seed formation are crucial for breeding programs and conserving this species in its natural habitats. This study aimed to investigate flower morphology and the seed formation associated with various reproductive systems, including self-pollination, apomixis, cross-pollination, and free pollination in white flax. The results of the flower morphology study showed that among the seven traits examined, all measured traits, except for the stamen length and petal width did not differ significantly between the two flower types, pin and thrum. Changes in style length indicated that in thrum flowers, the most significant changes occurred with flower opening, while in pin flowers, these changes were observed 24 hours after blooming. The investigation of the reproductive system of white flax using the Crowden method showed that pin and thrum flowers had facultative cross-pollination of 9.6% and 10%, respectively, as well as self-pollination. Additionally, the results revealed that the highest percentage of seed formation for both pin and thrum flower types were associated with free pollination. This study concluded that white flax is fundamentally a facultative cross-pollinating plant, which can utilize other reproductive methods depending on environmental conditions.

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Poster Presentation ID: 1069

Phytochemical analysis of *Nepeta kotschyi* Boiss. var. *persica* (Boiss.) Jamzad

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ARTICLE INFO	ABSTRACT
Keywords: Flavonoids <i>Nepeta kotschyi</i> <i>Persica</i> Phenolic acids Phytochemistry	<i>Nepeta kotschyi</i> var. <i>persica</i> (Boiss.) Jamzad, a species belonging to the Lamiaceae family, is recognized for its diverse range of bioactive secondary metabolites and promising medicinal potential. Despite its traditional use, a comprehensive phytochemical investigation of this variety has not been previously reported. In the present study, we focused on the detailed phytochemical profiling of the aerial parts of <i>N. kotschyi</i> var. <i>persica</i> . Hydroalcoholic extraction (MeOH 70%) was performed, followed by fractionation using ethyl acetate and methanol. Subsequent chromatographic separation involved column chromatography on silica gel with various mesh sizes and Sephadex® LH-20, employing a variety of solvents. As a result, six compounds were successfully isolated and structurally elucidated through NMR spectroscopy and optical rotation analysis: 1,5,9-epideoxyloganic acid (1), luteolin (2), caffeic acid (3), rosmarinic acid (4), luteolin 7-O-glucoside (5), and nepetalinic acid ((1R,2S,5S)-2-((S)-1-carboxyethyl)-5-methylcyclopentane-1-carboxylic acid) (6).

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Poster Presentation ID: 1070

Investigation the germination characteristics of sage seeds (*Salvia officinalis* L.) primed with salicylic acid under salinity stress conditions

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ARTICLE INFO	ABSTRACT
Keywords: Coefficient of allometry Germination uniformity Priming Salicylic acid Vigor index	Salinity stress is a significant abiotic factor that reduces the germination of seed plants. Sage (<i>Salvia officinalis</i> L.) is a perennial woody sub-shrub native to the Mediterranean region and is widely distributed in Iran. Certain plant hormones and antioxidants, such as salicylic acid (SA), have been shown to enhance the germination of medicinal plants under saline conditions. To investigate the impact of priming sage seeds with salicylic acid on germination traits under salinity stress, a factorial experiment was conducted using a completely randomized design (CRD) with four replications at the Physiology and Medicinal Plants Laboratory of Dr. Shariati Skill College of Tehran (TVU). The experimental factors included salinity levels (0, 3, 6, and 9 dS/m) and seed priming with SA at three concentrations: 0, 100, and 200 µM. Salinity stress had a significant and detrimental effect on all measured traits. Seed priming with salicylic acid (SA) positively influenced all investigated traits, except for the coefficient of allometry (CA), and mitigated the adverse impacts of salinity stress. SA enhanced the seed germination rate up to 100 µM at 6 dS/m of salinity; however, it was ineffective at 9 dS/m. Seed priming with 200 µM of SA resulted in the longest radicle length, measuring 36.2 mm, which was 39% greater than the control treatment. The length of the plumule also increased by 16.8% and 29.2% at concentrations of 100 and 200 µM, respectively, compared to the control treatment. As a result of seed priming with SA, the seed vigor index, seedling fresh weight, seedling dry weight, and seed germination uniformity exhibited significant increases of 41.3%, 27.5%, 19.7%, and 35.4%, respectively, compared to the control treatment. Overall, the results demonstrate that seed priming with 200 µM of SA enhances the germination characteristics of sage under salinity stress conditions.

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Poster Presentation ID: 1071

The study of stomata and leaf epidermis in *Hedera* species in the northern of Iran

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ARTICLE INFO

Keywords:

Gilan
Micromorphology
SEM
Shrub
Stomata

ABSTRACT

Hedera is a genus of the Araliaceae family. Its species are evergreen shrubs with aerial roots and twisted sterile branches. This genus is distributed in Asia Minor-Caucasus to Iran, Europe, Transcaucasia-Northern Iran-Eastern Transcaucasia. Its leaves contain a wide range of metabolites that have significant medicinal effects. In this study, the morphological structure of the stomata and leaf epidermis of 7 populations of two species *H. helix* and *H. pastuchovii* was investigated. For this purpose, healthy samples of the studied species were collected and identified from the northern provinces including Gilan, Mazandaran and Golestan, and leaf sections were sent to the Razi Metallurgical Center in Tehran for scanning electron microscopy (SEM). In both species, the stomata are located in the lower epidermis. The morphology of the epidermis showed two types of epidermal cells: puzzle-shaped and polygonal cells. Two types of hairs were identified, including star hairs in *H. helix* and scaly hairs in *H. pastuchovii*. The results showed that these species differ in terms of micromorphological characteristics, and these data provide reliable evidence for the taxonomic separation of these two species.

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Poster Presentation ID: 1074

The Effect of *Nigella sativa* Seed Powder on the Growth Performance of Holstein Dairy Calves During the Pre-Weaning Period

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ARTICLE INFO

Keywords:

Body weight
Growth performance
Dairy calves
Black cumin
Nutraceutical

ABSTRACT

Dairy calves can benefit from the growth-promoting effect of antibiotics in their subtherapeutic doses (1). However, prolonged usage may lead to antibiotic residues in foods of animal origin and the emergence of antimicrobial-resistant microorganisms (2). In an attempt to find an effective alternative, the effect of *Nigella Sativa* on the growth performance of dairy calves was assessed in the current experiment. A total of 32 male Holstein dairy calves were randomly subjected to four treatments and fed unsupplemented (control) or supplemented milk with 2, 4 or 6 g of *Nigella Sativa* powder (NSP2, NSP4 or NSP6, respectively) for a 65-d period. Body weight was measured at the start of the experiment and every ten days. Individual feed intake was measured daily. The average daily weight gain and feed conversion ratio were calculated at the end of the study. Initial body weight was considered as a covariate and data was analyzed using a MIXED procedure of SAS software. Body weight gain and average daily gain (1-65 d) were only significantly higher in NSP2 (but not NSP4 or NSP6) than in the control group ($P < 0.05$, 86.43 vs. 77.28 kg; 782.3 vs. 627.7 g/d). Final body weight was also higher in the NSP2 group compared to the NSP4 (but not control or NSP6) group ($P < 0.05$, 86.43 vs. 75.32 kg). In summary, feeding 2 g *Nigella Sativa* seed powder was effective in improving the growth performance of dairy calves during the pre-weaning period.

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The Effect of *Nigella sativa* Seed Powder on the Skeletal Growth of Holstein Dairy Calves During the Pre-Weaning Period

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ARTICLE INFO	ABSTRACT
Keywords: Herbal medicine Dairy calves Dosage Black cumin Skeletal growth	Morbidity and mortality rates of calves during the pre-weaning period surpass the recommended levels, and finding a practical solution is vitally important (1, 2). <i>Nigella Sativa</i> is a medicinal plant with anti-bacterial, anti-inflammatory, antioxidant and gastro-protective properties (3). The current study evaluated the effect of milk supplemented with <i>Nigella Sativa</i> powder (NSP) on the skeletal growth of dairy calves during the pre-weaning phase. A total of 32 Holstein male calves with an average initial body weight of 38 ± 0.1 were randomly subjected to the control (no additive), NSP2 (2 g NSP), NSP4 (4 g NSP), NSP6 (6 g NSP) groups for a 65-d rearing period. Skeletal growth parameters, including body length, body barrel, hip width, wither height, heart girth and hip height were measured every ten days. Data was analyzed using a MIXED procedure of SAS software. Feeding NSP increased body length gain compared to the control group ($P < 0.05$, 14.87, 1.50 or 14.00 vs. 10.37 cm for NSP2, NSP4 or NSP6 vs. control, respectively). Overall (1-65 d) body barrel was only significant in NSP2 (but not NSP4 or NSP6) compared to the control calves ($P < 0.05$, 87.92 vs. 85.00 cm). Interestingly, overall (1-65 d) hip width was significantly lower in NSP4 compared to the control, NSP2 or NSP6 groups ($P < 0.05$, 17.90 vs. 18.52, 18.55, or 18.65 cm). However, wither height, heart girth, and hip height did not significantly change. In summary, feeding 2 g NSP in the current study benefits skeletal growth.

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Poster Presentation ID: 1077

Investigation of antibacterial and antibiofilm activity of nanoemulsified essential oils of *Pelargonium graveolens* and *Satureja khuzistanica* using microfluidic systems

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ARTICLE INFO

Keywords:

Microfluidic chip

Pelargonium

graveolens

Satureja khuzistanica

Nanoemulsion

Antibiofilm

ABSTRACT

The application of essential oil nanoemulsions are growing to overcome the serious problem of antibiotic resistance. In this research, two different nanoemulsions using *Pelargonium Graveolens* and *Satureja khuzistanica* essential oils (EOs) were prepared and characterized. Next, the antibacterial properties of the essential oils (EOs) and their formulations were assessed, focusing on how different residence times and concentrations influenced the activity of the nanoemulsions. This evaluation included tests for the release of cellular components such as proteins, nucleic acids, and potassium, as well as determining the minimum inhibitory concentration (MIC), minimum bactericidal concentration (MBC), and performing time-kill studies. The ability of both nanoemulsions and pure oils at their MIC levels to prevent and eliminate *Salmonella enterica* biofilms was also examined. The use of a microfluidic chip significantly enhanced the antibacterial effects, likely due to the greater surface area facilitating contact between the agents and bacteria. The primary antibacterial mechanism of essential oil nanoemulsions is reported to be the disruption of the bacterial membrane, which leads to lysis, leakage of cellular contents, and ultimately bacterial death. [1]. The results showed that nanoemulsions could improve the antibacterial activity of nanemulsions compared to pure oils [2]. The results showed that the cell membrane wall began to rupture quickly after 5 min treatment, and the bacterial activity was nearly completely inhibited in a 15-min residence time as compared to the conventional method for 5 h operation.

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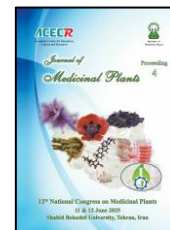
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Poster Presentation ID: 1079

Environmentally Friendly Production of CdS Quantum Dots Mediated by *Typha latifolia*: Characterization and Effects on Heavy Metal Absorption

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ARTICLE INFO	ABSTRACT
Keywords: CdS QDs <i>Typha latifolia</i> Ultrasonic-assisted extraction Wastewater	Quantum dots (QDs) are nanoscale semiconductor crystals that have garnered significant attention in nanoscience due to their unique optical and electronic properties [1]. This research explores an efficient, safer, and environmentally friendly method for synthesizing CdS quantum dots (QDs) by utilizing an extract from <i>Typha latifolia</i>. The plant's aqueous extract was prepared using ultrasonic treatment for 20 minutes and served as a natural stabilizing agent during the synthesis of CdS QDs in the presence of CdCl₂ and Na₂S. The resulting CdS QDs were characterized by fluorescence spectroscopy, UV-Vis absorption, Fourier transform infrared (FT-IR) spectroscopy, scanning electron microscopy (SEM), and X-ray diffraction (XRD). An absorption peak near 425 nm and a maximum fluorescence emission at 483 nm confirmed the successful formation of CdS QDs. The synthesized quantum dots exhibited a uniform spherical shape with an average diameter of 7.89 nm. Furthermore, in this study, <i>Typha</i> plants were exposed to different concentrations of cadmium salt (CdCl₂) and plant-synthesized cadmium sulfide quantum dots (CdS QDs). After 72 hours, noticeable differences appeared in the treated plants compared to the control group. In both treatment groups, the leaves showed visible yellowing. Atomic absorption spectroscopy revealed that cadmium concentrations in the roots and aerial parts were 1.85 ppm and 1.24 ppm, respectively. Overall, more cadmium was accumulated in the roots than in the aerial parts, which aligns with previous research [2]. These findings demonstrate that <i>Typha</i> is highly effective in absorbing heavy metals and can be a promising candidate for wastewater treatment.

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Poster Presentation ID: 1080

Biosynthesis of gold nanoparticles after ultrasonic assisted extraction of aqueous extract of *Typha latifolia* and evaluation of antibacterial activity

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ARTICLE INFO	ABSTRACT
Keywords: Au NPS <i>Typha latifolia</i> Antibacterial Ultrasonic-assisted extraction	In recent years, green-synthesized nanoparticles (NPs) from the plant extract have drawn great interest, due to their prospective nanomedicinal applications [1]. This study investigates a proficient, safer, and sustainable way to prepare Au NPs, using <i>Typha latifolia</i>. The aqueous extract of the plant was obtained by ultrasonic technique for 30 min. The extract was used as natural stabilizing precursors for synthesizing Au NPs, in the presence of H₂AuCl₄ 6 M [2]. The synthesized gold nanoparticles (Au NPs) were analyzed using several methods. Their optical properties were examined by UV-visible spectroscopy and absorption measurements. Other characterization techniques, such as X-ray diffraction (XRD), Zeta Sizer analysis, and dynamic light scattering (DLS), were used to determine particle size and structural features. The appearance of a broad absorption peak around 529 nm verified the successful synthesis of Au NPs. Transmission Electron Microscopy (TEM) showed that the average nanoparticle size was under 35.50 nm. Zeta potential measurements pointed to moderate colloidal stability, with a value of +23 mV, and XRD confirmed that the nanoparticles had a cubic crystalline structure, consistent with known standards. Moreover, the Au NPs demonstrated strong antibacterial activity against <i>E. coli</i>, with a minimum inhibitory concentration (MIC) of 3.12 µg/mL and a minimum bactericidal concentration (MBC) of 6.24 µg/mL, surpassing the efficacy of <i>Typha latifolia</i> extract. The enhanced efficacy of Au NPs can be attributed to their high surface-to-volume ratio, which increases the interaction between the nanoparticles and the bacterial cells [3].

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Poster Presentation ID: 1081

Investigation of the dye removal property of modified starch in one-component and two-component systems

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ARTICLE INFO	ABSTRACT
Keywords: Starch Kinetic Adsorption	Among the various methods studied and used, adsorption methods have been notable for their ability to remove very persistent pollutants for the removal of dyes and other contaminants from industrial wastewater, which has become a practical method for pollution control. Therefore, the study of the structure of natural polymers, including starch, due to the abundance and low cost of methods and their biodegradability, is of more interest today, as they can replace many non-biodegradable synthetic and artificial materials in many cases. Due to their special structure, physical and chemical properties, high reactivity and high selectivity towards aromatic compounds and metals, they represent an interesting and attractive alternative as an adsorbent. Starch, this natural polymer, provides this possibility due to the presence of hydroxyl groups on its structure and the ability to react with basic dyes, but due to its low capacity and viscosity, it is subjected to chemical, physical or genetic modifications for multiple uses, which is the most important method of chemical modification of starch. Starch under chemical modification acquires special properties, which are called modified starch. In this paper, the decolorization capability of ethylenediamine modified starch as an adsorbent was investigated in single and two-component systems. Also, adsorption behaviors such as decolorization (color removal), adsorption capacity, kinetics and adsorption isotherm were evaluated under conditions such as initial dye concentration, adsorption time and adsorbent amount. Surface-modified starch as a natural polymer (biopolymer) can be effectively used as an adsorbent for the removal of cationic or anionic dyes, and pure starch with the lowest adsorption capacity and high decolorization can be used as an adsorbent for cationic dyes.

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Poster Presentation ID: 1082

Evaluation of the Effects of Aqueous Extracts from Several Plants and Culture Medium pH on the Growth of *Aspergillus flavus*

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ARTICLE INFO	ABSTRACT
Keywords: Plant extract Oxidative stress Disc diffusion method Paper disk Aflatoxins	<i>Aspergillus flavus</i> is an opportunistic pathogenic fungus that commonly grows on agricultural products like grains, oilseeds, and dried fruits, producing aflatoxins that threaten human and animal health. Due to increasing resistance to chemical fungicides and environmental concerns, natural alternatives such as plant extracts are gaining attention. This study investigated the antifungal effects of aqueous extracts from the roots of three plants—<i>Glycyrrhiza glabra</i> (licorice), <i>Nerium oleander</i>, and <i>Lavandula angustifolia</i> (lavender)—on <i>A. flavus</i> growth. Extracts were obtained using maceration in distilled water, followed by ultrasonic treatment and shaking. The antifungal activity was tested at concentrations of 12.5, 25, 50, and 100 mg/mL using the paper disk diffusion method on PDA medium, with nystatin as a positive control and distilled water as a negative control. The results showed that at the natural pH (5.3), none of the extracts demonstrated significant antifungal effects, with no inhibition zones observed. However, increasing the pH of the medium led to the formation of inhibition zones, especially with licorice extract, suggesting enhanced antifungal activity under alkaline conditions. This improvement is likely due to bioactive compounds such as saponins, flavonoids, phenolics, and terpenoids, which may act by disrupting fungal cell membranes, inhibiting essential enzymes, or inducing oxidative stress. The findings highlight licorice's potential as a natural antifungal agent and emphasize the importance of environmental factors, such as pH, in enhancing the effectiveness of plant-based treatments.

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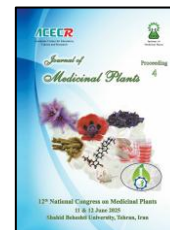
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Poster Presentation ID: 1084

Impact of Plant Growth-Promoting Microorganisms and Phosphorus Concentration on Secondary Metabolite Production of Hydroponically Cultured Basil (*Ocimum basilicum* L.)

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ARTICLE INFO

Keywords:

Hydroponic

PGPM

Phosphorus

Secondary metabolite

ABSTRACT

Plant growth promoting bacteria and fungi present in the rhizosphere are widely acknowledged for their role in stimulating plant growth and enhancing the accumulation of secondary metabolites. They are also recognized as a rich source of various bioactive compounds [1]. Although these microorganisms are commonly utilized in conventional agriculture to boost productivity, their application in soilless agricultural systems is still restricted and has not been thoroughly investigated [2]. The objective of this study was to analyze the impact of *Bacillus subtilis*, *Pantoea agglomerans*, *Serendipita indica*, and *Funneliformis mosseae* at different phosphorus levels (40, 20, and 10 mg/l) on the synthesis of secondary metabolites in basil (*Ocimum basilicum* L.) grown hydroponically. The results indicated that application of *S. indica* and *P. agglomerans* at a phosphorus level of 40 mg/l resulted in a significant rise in the percentage of essential oil, showing increases of approximately fourfold and threefold compared to the control group, respectively. The GC-MS analysis of essential oil derived from basil plants revealed that the inoculation with plant growth-promoting microorganisms (PGPMs) at varying phosphorus concentrations influenced the composition of the essential oil components. The most abundant component was Estragole (Methyl chavicol), followed by δ -Cadinene, Methyl Eugenol, Linalool and β -Farnesene. The highest concentration of Estragole (43.7% and 42.6%) was observed following inoculation with *F. mosseae* at phosphorus levels of 40 and 20 mg/l. The use of *B. subtilis* at a phosphorus concentration of 40 mg/l achieved the highest levels of δ -Cadinene (16.9%), β -Farnesene (7.6%), α -Bergamoten (6.89%), and γ -Cadinene (6.48%). The evidence presented in this study suggests that the use of PGPMs might be an effective strategy for boosting essential oil production.

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Poster Presentation ID: 1085

Phytochemical compounds production in *Glycyrrhiza glabra* L. affected by environmental conditions of cultivation regions

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ARTICLE INFO	ABSTRACT
Keywords: Phytochemical traits Glycyrrhizic acid Glabridin Altitude Licorice	<i>Glycyrrhiza glabra</i> L., also known as licorice, is a perennial herbaceous plant from the Fabaceae family. Native to parts of Asia and Europe, this plant is valued for its rich composition of bioactive compounds. Among its key constituents are proteins, amino acids, polysaccharides, pectin, starch, mineral salts, sterols, and resins. Additionally, licorice contains significant flavonoids, including glabridin, liquiritigenin, and liquiritin, as well as triterpenoid saponins such as glycyrrhizin and glycyrrhizic acid, which contribute to its medicinal and therapeutic properties [1]. These compounds demonstrate various biological effects, such as anticoagulant, anti-inflammatory, hepatoprotective, antitumor, anti-arteriosclerotic, antiviral, antimicrobial, antioxidant, and cytotoxic properties [2]. Determining the ideal growing areas and assessing how environmental factors influence growth is essential for choosing the best conditions to commercially produce key medicinal and industrial plants. This study examined the effects of different cultivation areas-Rayen, Eghlid, Kalat, and Zanjan-on the phytochemical traits of <i>Glycyrrhiza glabra</i>. The findings revealed that the location where the plants were grown significantly influenced their phytochemical characteristics. Samples from the Rayen region had the highest glycyrrhizic acid content at 17.92 mg/g DW and liquiritigenin content at 1.22 mg/g DW. The Eghlid region showcased the highest total phenol content and antioxidant activity. Additionally, the study found a negative and significant correlation between altitude and glabridin content, indicating that glabridin levels decrease with increasing altitude. Based on the needs of the food and pharmaceutical industries, the study recommends the Rayen region for the production of glycyrrhizic acid, the Kalat region for glabridin, and the Eghlid region for phenolic compounds.

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Evaluation of morphological diversity in Iranian *Alcea kurdica* populations

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ARTICLE INFO

Keywords:

Morphological traits
Genetic diversity
Plant breeding
Malvaceae

ABSTRACT

Alcea kurdica, a member of the Malvaceae family, is a highly polymorphic and widely distributed species native to eastern Iraq and western Iran. The *Alcea* genus, which comprises approximately 70 species, serves as a significant source of mucilage and exhibits broad ecological distribution [1]. Known for its striking appearance, this plant has long been valued not only for its beauty but also for its medicinal properties. Among the Kurdish population, *A. kurdica* has been traditionally used to treat a wide range of ailments, including tonsillitis, gastric and duodenal ulcers, pneumonia, urinary tract infections, and even alopecia [2]. In this study, the morphological diversity of seven populations of *A. kurdica* was evaluated to identify valuable traits for future breeding programs and medicinal purposes. The study focused on five quantitative and qualitative morphological traits. The highest coefficient of variation was related to the flower dry weight trait. The number of lateral branches ranged from 2 to 10, with the Mahabad population having the highest number and the Baneh population the lowest. Additionally, the maximum number of flowers per plant was observed in the Targauar population (130), while the minimum was recorded in the Hamedan population (12). The dry weight of flowers varied between 71.16 and 792.12 (g/plant), with the highest value in the Targauar population and the lowest in the Maragheh population. Furthermore, the flower diameter ranged from 4 to 19.5 (cm), and plant height varied between 50 and 203 (cm), with the highest values observed in the Targauar population. The high diversity observed among different populations of *A. kurdica* provides good potential for selecting the best populations and using them in domestication projects, cultivation, and breeding programs.

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Ammoresinol: An Anti-*Listeria* Compound from Gum Ammoniacum

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ARTICLE INFO

Keywords:

Ammoresinol
Antibacterial
Food
Gum ammoniacum
Listeria monositogenes

ABSTRACT

Listeria monocytogenes is a Gram-positive, facultative intracellular pathogen responsible for listeriosis, a severe foodborne illness with high mortality rates (20–30%) in susceptible populations. Pregnant women, neonates, the elderly, and immunocompromised individuals are particularly vulnerable to invasive infections, which can lead to septicemia, meningitis, or spontaneous abortions. Given its ability to persist in food-processing environments and resist refrigeration temperatures, *L. monocytogenes* poses a significant challenge to food safety. Traditional control methods, including chemical sanitizers and antibiotics, face limitations due to emerging resistance and consumer demand for natural alternatives [1]. *Ferula ammoniacum*, a perennial plant (Apiaceae family) distributed in several Asian countries, including Afghanistan, India, Iran, Pakistan, and Turkmenistan. This plant, locally known as "Kandal," "Vasha," and "Koma-Kandal," exudes gum ammoniacum, a medicinal gum resin, from stem, leaf, and petiole pores during flowering and fruiting stages. In Iranian traditional medicine (ITM), it serves as an anthelmintic for gastrointestinal disorders. Gum ammoniacum is recognized in the British pharmacopoeia for its antispasmodic and expectorant effects. Additionally, this gum has demonstrated antibacterial and vasodilatory properties. Dichloromethane-methanol (1:1) extract of gum ammoniacum exhibit broad-spectrum antibacterial activity, suggesting the plant's potential as a source of antibacterial agents. However, their efficacy against *L. monocytogenes* remains unexplored [2]. Ammoresinol (Fig. 1), purified from the ethyl acetate extract of gum ammoniacum, inhibited bacterial growth (MIC 20 µg/mL) and reduced *L. monocytogenes* virulence by limiting surface persistence and food contamination potential (sub-MIC 10 µg/mL). Furthermore, ammoresinol disrupted biofilm formation and suppressed the expression of key virulence genes associated with adhesion and invasion. These findings suggest that ammoresinol holds promise as a natural antimicrobial agent for controlling *L. monocytogenes* and mitigating its associated foodborne illness risks.

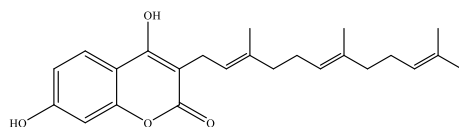


Fig. 1. Ammoresinol

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Plant-mediated synthesis of CuO nanoparticles: structural characterization and antibacterial performance

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ARTICLE INFO	ABSTRACT
Keywords: CuO NPS <i>Ficus carica</i> Antibacterial Ultrasonic-assisted extraction	In recent years, utilizing green, biogenic methods for synthesizing nanoparticles (NPs)—particularly those involving plant secondary metabolites—has become increasingly important. Biological approaches typically achieve a much faster reduction rate than traditional chemical and physical processes. As a result, these methods are not only environmentally friendly and cost-effective, but also well-suited for large-scale production. [1]. In this research, the prepared <i>Ficus carica</i> extracts obtained at 45 °C, after 15 min ultrasonic process, were used as natural precursors in the synthesis of CuO NPs. The structure of synthesized CuO NPs was studied by UV-Vis and Fourier transform infrared (FTIR) X-ray diffraction (XRD), energy-dispersive X-ray spectroscopy (EDS), scanning electron microscopy (SEM). The average particle size of the prepared CuO NPs was estimated to be around 105 nm from SEM images. UV-Vis absorption and fluorescence analyses indicate a wide absorption band ~406 nm and an intense emission peak at 467 nm. In addition, the CuO NPs exhibited notable antibacterial effects against <i>E. coli</i>, showing a minimum inhibitory concentration (MIC) of 0.8 mg/mL and a minimum bactericidal concentration (MBC) of 3.2 mg/mL, outperforming the <i>Ficus carica</i> extract. This superior performance of CuO nanoparticles is likely due to their large surface-to-volume ratio, which enhances their interaction with bacterial cells [2].

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Poster Presentation ID: 1089

Biogenic Synthesis and Characterization of CdS Quantum Dots via *Phragmites australis* Extract: Antimicrobial Assessment

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ARTICLE INFO	ABSTRACT
Keywords: CdS QDs <i>Phragmites australis</i> Antibacterial Ultrasonic-assisted extraction	Quantum dots (QDs) are semiconductor nanocrystals that have attracted considerable interest in the field of nanoscience because of their distinctive optical and electronic characteristics [1]. This research explores an efficient, safer, and environmentally friendly method for synthesizing CdS quantum dots (QDs) by utilizing an extract from <i>Phragmites australis</i>. The plant's aqueous extract was prepared using ultrasonic treatment for 30 minutes and served as a natural stabilizing agent during the synthesis of CdS QDs in the presence of CdCl₂ and Na₂S. The resulting CdS QDs were characterized by fluorescence spectroscopy, UV-Vis absorption, Fourier transform infrared (FT-IR) spectroscopy, scanning electron microscopy (SEM), and X-ray diffraction (XRD). An absorption peak near 420 nm and a maximum fluorescence emission at 495 nm confirmed the successful formation of CdS QDs. The synthesized quantum dots exhibited a uniform spherical shape with an average diameter of 5.32 nm. Furthermore, the antimicrobial properties of both the plant extract and the biologically synthesized CdS QDs were evaluated using methods such as disk diffusion, minimum inhibitory concentration (MIC), minimum bactericidal concentration (MBC), and assays for nucleic acid and protein leakage. The MIC and MBC values for CdS QDs against <i>B. subtilis</i> were determined to be 0.2 mg/mL and 0.4 mg/mL, respectively, compared to 32 mg/mL for both measurements using the plant extract. Additionally, after two hours of exposing bacteria, potassium leakage was measured at 1.35 ppm for CdS QDs and 0.87 ppm for the extract. These results indicate that the nanoparticles have much greater antimicrobial activity than the extract, which is probably because their smaller size and higher surface-to-volume ratio enhance their effectiveness [2].

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Poster Presentation ID: 1090

Ultrasonic-assisted extraction of *Phragmites australis* aqueous extract for the biosynthesis of silver oxide nanoparticles and assessment of their antibacterial properties

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ARTICLE INFO	ABSTRACT
Keywords: Ag₂O NPS <i>Phragmites australis</i> Antibacterial Ultrasonic-assisted extraction	Recently, there has been growing interest in green-synthesized nanoparticles (NPs) derived from plant extracts because of their promising potential in nanomedicine. [1]. This study investigates a proficient, safer, and sustainable way for the preparation of Ag₂O NPs, using extract of the <i>Phragmites australis</i> plant. The aqueous extract of the plant was obtained by ultrasonic technique at 30 min. The extract was used as natural stabilizing precursors for synthesis of Ag₂O NPs, in the presence of silver nitrate. Characterization of the as-synthesized Ag₂O samples was carried out using fluorescence, UV-Vis and Fourier transform infrared (FT-IR) spectroscopies, Scanning electron microscopy (SEM) and X-ray diffraction (XRD). A clear absorption spectrum around 390 nm and a maximum fluorescence peak at 453 nm clarified the successful synthesis of Ag₂O NPs [2]. The results reveal the uniform spherical morphology for the synthesized Ag₂O NPs with the average diameters of 65 nm. Additionally, the antimicrobial activity of both the plant extracts and the biosynthesized Ag₂O nanoparticles was evaluated using methods such as disk diffusion, minimum inhibitory concentration (MIC), minimum bactericidal concentration (MBC) assays, Nucleic acid and protein leakage. The MIC and MBC for Ag₂O nanoparticles against <i>E. coli</i> were found to be 0.4 mg/mL and 0.8 mg/mL, respectively, while for the extract, both values were 32 mg/mL. Potassium leakage measurements after 3 hours of bacterial exposure showed values of 1.12 ppm for the nanoparticles and 0.53 ppm for the extract. These findings demonstrate that the nanoparticles exhibit significantly higher antimicrobial effectiveness compared to the extract, likely due to their smaller particle size and larger surface-to-volume ratio [3].

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Poster Presentation ID: 1091

Effect of compound edible coating on the shelf-life and quality properties of (*Ziziphus mauritiana* Lam.)

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ARTICLE INFO	ABSTRACT
Keywords: Storage Edible coating Essential oil Ber fruit Fruit quality	In this study, the effect of a composite edible coating consisting of sodium alginate and Shirazi thyme (<i>Zataria multiflora</i>) essential oil (ZEO) at 0.5 and 1% and containing fixed amounts of anti-browning agents ascorbic acid and citric acid (each at a concentration of 1% w/v), calcium chloride as a crosslinking agent (2% w/v), and glycerol as a plasticizer (8% v/v) on the quality indicators of Ber fruit during 28 days of storage was investigated. <i>Ziziphus mauritiana</i>, also known as Ber fruit, is a tropical fruit from the Rhamnaceae family with high nutritional value and a short shelf life. In the present research, in order to preserve the quality characteristics during the storage period Ber fruits by treating them with alginate (Al) and Shirazi thyme essential oil (ZEO) at concentrations of 0.5% and 1% separately, or in combination with together. The treated fruits were then stored at a temperature of 1 ± 6 C°, and relative humidity of 90-95% for 28 days. To study the effects of five edible coating factors and one continuous quantitative factor (storage time) on the physicochemical parameters of the samples, The factorial experiment was conducted as a completely randomized design. Fruit parameters such as fruit weight loss, respiration rate, total soluble solids (TSS), fruit firmness, ascorbic acid and sensory evaluation were evaluated. result showed that all treatments, maintained fruit quality compared to the control. The Al + ZEO treatment had a significant effect on reducing respiration rate. This combined treatment reduced weight loss, decay percentage, and fruit softening while slowing down the increase in TSS. Furthermore, the coated fruits had higher levels of ascorbic acid compared to the untreated fruits. Overall, the process of optimizing the edible coating revealed the ability of ZEO in combination with alginate to relatively preserve the quality characteristics of the Indian gooseberry fruit during 28 days of storage.



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Does the simultaneous use of herbal cough syrups with antibiotic syrups cause any interaction? An experimental study

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ARTICLE INFO

Keywords:

Herbal medicine
Drug interaction
Antibiotics
Antimicrobial synergy
Herbal cough syrup

ABSTRACT

The increasing global preference for herbal remedies, coupled with their acknowledged therapeutic and nutritional benefits, has led to their widespread usage alongside conventional pharmaceuticals. Despite the popular belief that natural products are inherently safe, the co-administration of herbal and synthetic medications may result in significant pharmacological interactions, influencing efficacy and safety profiles. Despite public perception of herbal safety, the complex chemical nature of many herbs underscores the necessity for caution, as herb-drug interactions may still occur under different conditions or with other agents. This study investigates the potential interactions between commonly used herbal cough syrups and antibiotics—namely cefixime, azithromycin, and co-amoxiclav—with a focus on their antimicrobial effectiveness. The study utilized the agar well diffusion method to evaluate the antimicrobial activity of selected herbal syrups and antibiotics, both individually and in combination. Standard microbial strains, including *Staphylococcus aureus* (Gram-positive), *Pseudomonas aeruginosa* (Gram-negative), and beta-hemolytic *Streptococcus* type A, were inoculated on Mueller-Hinton agar plates. Wells were created using a cork borer, and test agents were introduced in triplicates. The diameter of inhibition zones was measured using a precision caliper. The measured inhibition zones for both the antibiotics and herbal syrups, when applied individually or in combination, revealed no significant interaction. The concurrent use of these herbal cough syrups with the tested antibiotics did not result in either synergistic enhancement or antagonistic reduction in antimicrobial activity. This study emphasizes the importance of comprehensive patient assessment and pharmaceutical consultation when recommending concurrent herbal and conventional treatments

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Poster Presentation ID: 1093

Investigating the Effect of Aromatherapy with Peppermint Essential Oil on the Quality of Recovery and Satisfaction of Patients undergoing Laparoscopic Cholecystectomy: A randomized clinical trial

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ARTICLE INFO	ABSTRACT
Keywords: Cholecystectomy Laparoscopic Aromatherapy Peppermint Recovery quality	Laparoscopic cholecystectomy is a common procedure, and many patients experience adverse surgical outcomes. Therefore, one of the aspects that should be considered is the evaluation of patient recovery. This study was conducted to assess the impact of aromatherapy with peppermint essential oil on the quality of recovery and patient satisfaction following laparoscopic cholecystectomy. This parallel, unblinded, randomized clinical trial was conducted in 2022 at Besat and Beheshti Hospitals in Hamadan, Iran, and the ethics code number is IR.UMSHA.REC.1401.136. Using convenience sampling, 140 patients were selected and randomly divided into two groups, A and B. Patients in group A (control) received only routine nursing care. In addition to routine care, patients in the intervention group B received aromatherapy with peppermint essential oil. The data were analyzed using the 15-item Quality of Recovery (QoR-15) tool and satisfaction measured with the Numeric Rating Scale (NRS) in SPSS 23. The two groups did not have significant differences in demographic characteristics and were homogeneous ($p > 0.05$). Before the intervention, the two groups did not have significant differences in recovery quality scores and were homogeneous ($P > 0.05$). After the intervention, the mean recovery quality score ($P < 0.001$) and patient satisfaction ($p < 0.001$) were significantly higher in the aromatherapy group with peppermint essential oil. Aromatherapy with peppermint essential oil can be effective in improving the quality of recovery and satisfaction of patients undergoing laparoscopic cholecystectomy. However, further studies are needed to determine the generalizability of the findings.

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Investigation of Biochemical Traits of Eight Medicinal Plant Species from the Lamiaceae Family under the Climatic Conditions of Firouzkouh City

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ARTICLE INFO	ABSTRACT
Keywords: Essential oil GC-MS Spectrophotometer Antioxidant Activity	Medicinal plants have long played a vital role in traditional and modern healthcare systems due to their therapeutic properties and bioactive compounds. Among these, essential oil-bearing species are of particular interest for their diverse applications in pharmaceuticals, cosmetics, and food preservation. The composition and concentration of these compounds can be significantly influenced by environmental conditions and species differences. The purpose of this study was to investigate the biochemical characteristics of eight medicinal plants of Lamiaceae family in the climatic conditions of Firouzkouh city. The experiment was conducted in a completely randomized design with three replications in the laboratory of Gorgan Agricultural Science and Natural Resources. The plant species included lavender (<i>Lavandula angustifolia</i>), hyssop (<i>Hyssopus officinalis</i>), thyme (<i>Thymus vulgaris</i>), rosemary (<i>Rosmarinus officinalis</i>), sage (<i>Salvia officinalis</i>), moldavian balm (<i>Dracocephalum moldavica</i>), peppermint (<i>Mentha × piperita</i>), and lemon balm (<i>Melissa officinalis</i>). Measured traits included antioxidant activity of essential oil, essential oil percentage, and its components. Essential oil extraction was performed by a Clevenger apparatus, and essential oils of some plant species were measured by GC-Mass. Antioxidant activity were measured using a spectrophotometer. The results showed that the highest essential oil content (0.21%) was observed in rosemary, the highest antioxidant properties (13.13%) were found in peppermint, and the lowest was recorded in moldavian balm (0.35% free radical scavenging). According to the GC-MS results, the main essential oil components were as follows: rosemary (β-terpinene, 17.683%), lavender (linalool, 35.72%), sage (germacrone, 24.28%), hyssop (isopinocamphe, 29.75%), thyme (carvacrol, 38.25%), lemon balm (linalool, 35.25%), moldavian balm (geranial, 29.75%) and peppermint (menthol, 35.87%). These findings demonstrate the chemical diversity among different medicinal plants grown under similar environmental conditions. Furthermore, the study underscores the importance of selecting specific plant species for desired biochemical traits, which can contribute to optimizing the production of valuable secondary metabolites.

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Poster Presentation ID: 1095

Investigation of the antibacterial and antidiabetic effects of hydroalcoholic extracts of the *Eryngium billardieri*

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ARTICLE INFO	ABSTRACT
Keywords: <i>Eryngium billardieri</i> diabetes Antibacterial effect Extracts Antidiabetic effect	Diabetes mellitus is a widespread and potentially severe medical disorder that has significantly increased in prevalence in recent decades, emerging as a critical public health issue in the twenty-first century <i>Eryngium billardieri</i>, belonging to the Apiaceae family, is traditionally utilized in the treatment of diabetes(1). In this study, different extracts from the aerial parts of <i>E. billardieri</i> were prepared using different solvents of 100% water, 100% ethanol and ethanol-water mixture in the ratio of 50:50 and 70:30. <i>E. billardieri</i> plant was exposed to ultrasonic waves for 30 min via a probe sonicator with an amplitude of 50% and a maximum power output of 400 W. The α-amylase inhibition assay was conducted via the 3,5-dinitrosalicylic acid (DNSA) method. Also, the antimicrobial properties were investigated using the microbroth dilution method(2). Two pathogenic model bacteria were selected for this investigation: <i>Staphylococcus aureus</i> ATCC 25923, which is gram-positive, and <i>Escherichia coli</i> PTCC 1399, which is gram-negative. The findings indicated that the optimal extract was the 70:30 ethanol-water mixture (OEB), exhibiting an IC₅₀ value of $9.98 \pm 1.99 \mu\text{g/mL}$ for α-amylase inhibition, 70:30 showed the best antidiabetic effect of the extract compared to acarbose ($5.2 \pm 0.03 \mu\text{g/mL}$) (3). The results indicated that OEB exhibited weak antibacterial activity, failing to demonstrate any effect against <i>E. coli</i> at concentrations exceeding 64 mg/ml. Compared with their pure counterparts, plant extracts generally tend to have lower antimicrobial efficacy. Azithromycin served as the positive control in this study, with an MIC of 0.1 mg/ml for both bacterial strains. In general, <i>Eryngium billardieri</i> is a valuable plant in traditional medicine and has good antidiabetic properties.

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Poster Presentation ID: 1097

Optimizing Hairy Root Induction and Podophyllotoxin Production in *Linum album*: Impact of Induction Methods and *Rhizobium rhizogenes* Strains

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ARTICLE INFO

Keywords:

Hairy root
Line LS4
Podophyllotoxin
Strain A4
White flax

ABSTRACT

Linum album is a rare perennial medicinal plant endemic to Iran, known for its antiviral and anticancer properties, primarily attributed to the compound podophyllotoxin (PTOX) [1]. Although previous studies have explored hairy root culture techniques using wounding methods, the impacts of sonication and vacuum infiltration on *Linum album* have not been thoroughly examined. In this study, we developed an efficient method for inducing hairy root by employing two strains of *Rhizobium rhizogenes*, A4 and ATCC15834, through three techniques: sonication, vacuum infiltration, and wounding (injection) to inoculate the bacteria into *Linum album* seedlings. Over eight weeks, we evaluated the high-growth line LS4, previously derived using the sonication method with *Rhizobium rhizogenes* strain A4, by measuring its fresh and dry biomass weights, as well as its accumulation of podophyllotoxin (PTOX). Our results exhibited that the hairy root induction rate significantly improved with sonication (40%) and vacuum infiltration (37%) compared to the wounding method (17%). Notably, strain A4 yielded a much higher root induction rate (40%) than strain ATCC15834 (24.5%). The study revealed a consistent upward trend in both the fresh and dry weights of hairy roots in the LS4 line. By the sixth week, the increase in dry weight was greater than in previous weeks. The calculated growth rates were 0.56 g per day for fresh weight and 0.035 g per day for dry weight. The accumulation of PTOX reached a maximum of 0.5 mg/g of dry weight by the third week. Subsequently, the concentration of Methoxypodophyllotoxin (MPTOX) increased markedly, peaking at 12 mg/g of dry weight by the sixth week, underscoring a considerable MPTOX production. These findings highlight the potential of the line LS4 of white flax as a promising biosource for lignan production, with significant implications for future pharmaceutical applications.

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Evaluation of the protective effects of lycopene on tissue damage and Johnsen score in rats with glucocorticoid-induced testicular damage

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ARTICLE INFO	ABSTRACT
Keywords: Glucocorticoids Testis Lycopene Rat Histopathology	Background: Excessive glucocorticoid levels—whether from internal or external sources—have been linked to significant negative effects on male reproductive health and fertility. Despite the recognized risks, no specific treatment has been established to prevent glucocorticoid-induced testicular damage. Lycopene, a natural fat-soluble carotenoid with known antioxidant and fertility-enhancing properties, has emerged as a potential protective agent. Aim: This study aimed to assess the effects of low and high doses of lycopene on testicular histopathology and Johnsen score in a rat model of glucocorticoid-induced testicular injury. Methods: Thirty-two adult male rats were divided into four groups: a negative control (no treatment), a positive control (7 mg/kg dexamethasone intraperitoneally for 7 days), and two lycopene-treated groups (low dose: 4 mg/kg; high dose: 40 mg/kg, orally). On the eighth day, the rats were euthanized and their testicular tissue examined for structural damage and spermatogenic function using the Johnsen score. Results: The negative control group displayed normal testicular architecture, while the positive control group showed severe degenerative changes, including spermatogonia apoptosis, loss of spermatids, and epithelial disorganization. The low-dose lycopene group demonstrated partial improvement, though some degenerative features persisted. Notably, the high-dose lycopene group exhibited near-normal histological structure with minimal cell detachment and vacuolization. The Johnsen score significantly decreased in the positive control group. Both lycopene-treated groups showed a significant increase in score compared to the positive control, with the high-dose group achieving a greater effect, although not restoring values to normal control levels. Conclusion: Lycopene—particularly at higher dose—mitigates glucocorticoid-induced testicular damage and improves spermatogenesis in rats. These findings support further research into the potential of lycopene supplementation for preserving male fertility in individuals exposed to high glucocorticoid levels.

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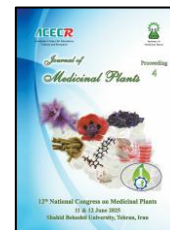
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Poster Presentation ID: 1099

NaHS alleviation of alkaline stress in black gram (*Vigna mungo* L.)

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ARTICLE INFO	ABSTRACT
Keywords: Alkaline stress Seed priming <i>Vigna mungo</i> L. Soluble sugar Proline	<i>Vigna mungo</i> L., commonly known as black gram and belonging to the Fabaceae family, is an important medicinal plant traditionally used to treat constipation, rheumatism, diabetes, indigestion, and gastritis. It is also a staple food in South Asia. To enhance seed germination and improve plant tolerance against biotic and abiotic stresses, the seed industry employs various resistance-inducing techniques, among which seed priming is highly effective. Sodium hydrosulfide (NaHS) has been demonstrated to enhance seed germination through priming. In this study, we hypothesized that NaHS seed priming would improve alkaline stress tolerance in black gram (<i>Vigna mungo</i> L.). Seeds were primed with different NaHS concentrations (0, 0.25, 0.5, 1, 1.5, 2, and 3 mM) for 24 hours and then sown in perlite-filled pots. At the six-leaf stage, plants were subjected to alkaline stress using NaHCO₃ (pH = 9) for 14 days. The results showed that alkaline stress significantly increased proline and soluble sugar levels compared to the control. However, NaHS priming—particularly at 1 mM—significantly mitigated alkaline stress effects by reducing proline and soluble sugar accumulation while enhancing overall plant performance under stress conditions.

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Poster Presentation ID: 1100

Design and performance analysis of wound dressing based on biodegradable polymer nanofibers, polylactic acid, carbon nanotubes and turmeric extract (curcumin)

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ARTICLE INFO	ABSTRACT
Keywords: Nanofibers Polylactic acid Curcumin Carbon nanotube	Recently, the use of biodegradable nanofibers for wound dressings has been investigated and developed. This study focuses on the development of PLA-curcumin wound dressings containing carbon nanotubes. Various samples of polylactic acid nanofibers were prepared using the electrospinning method, incorporating different weight percentages of carbon nanotubes and curcumin. The physical properties and structure of the nanofibers were confirmed through FT-IR and SEM analysis. The mechanical properties of nanofibers were also examined through tensile tests, revealing that the tensile strength of the nanofibers improves with the incorporation of CNTs. The drug release behavior of curcumin from the electrospun samples was assessed, demonstrating a specific release pattern for all samples. Given the critical role of wound dressings in absorbing secretions, water absorption tests were evaluated, showing that PLA nanofibers absorbed 364%, while PLA-Cur-0.03 CNT samples absorbed 163%. Toxicity assessments indicated no harmful effects on cell viability, with all samples showing high survival rates after 3 and 7 days. Furthermore, antibacterial tests demonstrated that samples containing carbon nanotubes exhibited significant antibacterial properties, with the PLA-Cur-0.05% CNTs sample showing the highest antibacterial efficacy of 78.95%. Using DFT calculation method, transition state, HOMO-LUMO energy, and equilibrium constant were calculated for keto and enol forms of curcumin in various solvents. The equilibrium constant in keto-enol transformations was higher than enol-keto. This innovative approach holds great promise for improving the effectiveness and sustainability of wound care.

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Poster Presentation ID: 1101

Changes in the production of triterpenic and phenolic acids in *Salvia officinalis* via supplemental LED lights

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ARTICLE INFO	ABSTRACT
Keywords: Sage Supplemental light Secondary metabolites Triterpenic	There is substantial market demand for sage, and improving its quality is an urgent issue to address in production. Artificial and supplemental light sources have been widely utilized in growing vegetables and medicinal plants; yet, little is known about the impact of light quality on the accumulation of secondary metabolites in <i>Salvia officinalis</i>. This study investigated the effects of blue light (460 nm), red light (635 nm), two combinations of blue and red light (67% red + 33% blue), and no supplemental light (as a control) on the accumulation of triterpenic and phenolic acids in <i>S. officinalis</i>. Based on the findings, the content of phenolic acids such as rosmarinic acid, chlorogenic acid, and caffeic acid showed no significant differences among the various light treatments. However, red and blue lights generally caused a slight increase in chlorogenic and caffeic acid content compared to the control. Moreover, the content of triterpenic acids, including oleanolic and ursolic acid, displayed significant differences across various light treatments. In contrast, the content of betulinic acid did not show significant variation. Overall, the light treatments, compared to the control, led to a noticeable increase in the accumulation of all three triterpenic acids. This study will contribute to understanding how light quality influences the biosynthesis of triterpenic and phenolic acids in <i>S. officinalis</i>, guiding the utilization of artificial light to enhance yield and quality in field production.

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Poster Presentation ID: 1102

Chemical Constituents of the Essential Oil from Iranian *Melia azedarach*'s Blooms

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ARTICLE INFO

Keywords:

Melia azedarach

Essential oil

Nerolidol

ABSTRACT

Melia azedarach L. (family: Meliaceae) is a deciduous tree that is native to northeastern India. It has several common names, such as White cedar, Persian lilac, Tulip cedar, and Chinaberry. The plant has been introduced into several countries in Asia, North America, and Latin America. For the Indian natives, it has been known for quite a long time that the three members of the family Meliaceae are a good source of folk medications. This fact drew the attention of many scientists around the world to study the potential contribution of those plants to their efforts in finding suitable, effective, and environmentally friendly products to control pests or diseases. Insecticidal, acaricidal, fungicidal, and rodenticidal potentials of extracts made from various parts of the plant have been proven by many workers in several countries. Antiviral, antibacterial, and antifungal potentials of the plant extract have been reported by many investigators working on human and animal diseases. Among these diseases are skin Cellulitis and herpes simplex. The blooms of *Melia azedarach* L. collected from Alborz province (Iran), April 2024. The essential oil of them was isolated through hydro-distillation method using Clevenger-type apparatus and examined via gas chromatography–mass spectrometry (GC–MS) techniques. The chemical composition of the essential oil was analyzed and identified about 17 compounds representing more than 88% of the oil. Oil yield was low, and the major compounds identified were Nerolidol (46.8%), Bicyclogermacrene (14.3%) and Verticiol (8.58%). Nerolidol has been extensively studied for its therapeutic potential because of its pharmacological activities in the treatment of neurodegenerative diseases. The high percentage of this compound in *Melia azedarach* L. essential oil makes this plant a suitable target for pharmaceutical research.

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Poster Presentation ID: 1104

Natural small-molecules reverse the genes and non-coding RNAs function related to the colorectal cancer pathogenesis: bioinformatic and artificial intelligent

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ARTICLE INFO

Keywords:

Colorectal cancer
Non-coding RNAs
Kaempferol
Tectorigenin
Pinostilbene and d-
pinitol

ABSTRACT

Colorectal cancer (CRC) remains a leading cause of cancer-related mortality worldwide, driven by complex genetic and epigenetic alterations, including dysregulated coding genes and non-coding RNAs (ncRNAs). Conventional chemotherapies such as 5-FU face limitations due to resistance mechanisms often mediated by these molecular changes. (NSM) Natural small molecules (tectorigenin, pinostilbene, d-pinitol, and kaempferol) with proven safety profiles offer immense potential as modulators to reverse oncogenic gene and ncRNA expression signatures. However, systematic identification and mechanistic understanding remain challenging. We proposed a comprehensive, AI-driven bioinformatics pipeline integrating multi-omics datasets (genomics, transcriptomics including lncRNAs and miRNAs), drug-target interaction databases, and molecular docking. four groups were divided (n=24), including Normal mice, mice with MNU treatment (CRC group), mice with CRC-treated chemotherapy which received 5-FU (CRC+chemo), mice with CRC+chemo-treated NSM which was received by gavage (CRC+NSM group). Proteomic analysis is performed via bioinformatics to identify the potential diagnostic or prognostic biomarkers and innovation of new treatment strategies. qPCR technique was used. On the basis of the three genes signatures were developed for drug resistance. Data indicated that MLH, ERCC1, and TYMS overexpressin in CRC+chemo. MLH, ERCC1, and TYMS reversed in CRC+NSM group. We explore novel biomarkers for proper management, early prognosis, and diagnosis. Hub genes are recognized as druggable proteins for drug design and discovery approaches.

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3. Sparassis latifolia and exercise training as complementary medicine mitigated the 5-fluorouracil potent side effects in mice with colorectal cancer: bioinformatics approaches, novel monitoring pathological metrics, screening signatures, and innovative management tactic



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Poster Presentation ID: 1105

Autophagy Contribution in Quercetin's Protective Effect (TM4 Cells)

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ARTICLE INFO	ABSTRACT
Keywords: Quercetin Autophagy ROS	Quercetin is a flavonoid, a type of plant pigment found in various fruits, vegetables, and grains. It has gained attention for its potential health benefits, particularly due to its antioxidant, anti-inflammatory, and anticancer properties. This study investigates the impact of quercetin (QCT) on ZO-NP-induced toxicity in mouse Sertoli cells (TM4 cell line) and explores the underlying mechanisms. To assess the role of autophagy, cells were pre-treated with 3-Methyladenine (3MA), an autophagy inhibitor. Results showed that ZO-NPs significantly decreased cell viability and increased apoptosis rates, as evidenced by a higher Bax/Bcl-2 ratio and downregulation of autophagy-related gene expression. ZO-NPs also induced oxidative stress, marked by elevated levels of malondialdehyde and reactive oxygen species (ROS), alongside reductions in antioxidant factors such as superoxide dismutase, catalase, glutathione, and glutathione peroxidase. However, these adverse effects were notably reversed in the QCT + ZO-NPs group. Pre-treatment with 3MA significantly reduced cell viability in TM4 cells exposed to both QCT and ZO-NPs compared to untreated controls. Overall, these findings suggest that QCT protects TM4 cells from ZO-NP-induced toxicity by promoting autophagy, preventing apoptosis, and suppressing oxidative stress.

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Poster Presentation ID: 1106

Inulin Mitigates Methotrexate Toxicity

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ARTICLE INFO	ABSTRACT
Keywords: Inulin MTX Methotrexate	Inulin is a naturally occurring carbohydrate belonging to a class of dietary fibers called fructans. It is found in various plants, serving as a reserve carbohydrate. Inulin, known for its antioxidant properties, has exhibited hepatoprotective effects. Methotrexate (MTX) is a widely used drug for treating cancer and inflammatory diseases, but its usage is associated with hepatotoxicity. This study aimed to evaluate the effects of inulin on MTX-induced liver toxicity. The results indicated that MTX administration caused significant liver damage, along with alterations in serum biomarkers across all mice. Specifically, we observed a decrease in Bcl-2 levels and an increase in caspase-3 activity and miR-122 expression compared to the control group. In contrast, pre-treatment with inulin significantly improved these alterations induced by MTX. In conclusion, our findings provide new evidence that the hepatoprotective effects of inulin may be mediated through the modulation of apoptotic and oxidative stress factors.

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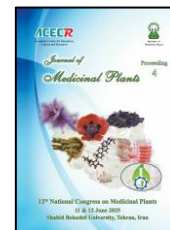
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Poster Presentation ID: 1107

Aerobic training along with *Sparassis latifolia* regulated the NEAT1/IL10/Nlrp3/Caspase3/IL8 in colorectal cancer mice model.

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ARTICLE INFO	ABSTRACT
Keywords: Colorectal cancer Complementary medicine <i>Sparassis latifolia</i> Aerobic training	Early detection and assessment of colorectal cancer (CRC) are essential for reducing its associated mortality rates. Complementary medicine offers a valuable approach to improving management and control of CRC-related conditions. Moreover, combining physical exercise with anticancer supplements has been shown to boost treatment efficacy while lessening the toxic side effects of chemotherapy. <i>Sparassis latifolia</i> (SLPs) is a rare edible medicinal mushroom characterized by a fruiting body rich in diverse bioactive compounds. To explore its potential, we administered bioactive substances extracted from <i>Sparassis latifolia</i> and implemented exercise programs either alone or alongside chemotherapy. Using qPCR, we measured the expression levels of genes NEAT1, IL10, Nlrp3, Caspase3, and IL8 in real time. The results revealed that both chemotherapy and colorectal cancer significantly altered the expression patterns of these genes.

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Poster Presentation ID: 1108

Evaluation of Inulin Content of Two-Years-Old Artichoke (*Cynara scolymus*) Roots Influenced by Plant Density and Nutrition System

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ARTICLE INFO	ABSTRACT
Keywords: Artichoke Functional foods Inulin Plant density Plant nutrition	Inulin, with a fibrous and water-soluble structure, is used as a compound with biological activity for the production of functional foods. Food products enriched with inulin have beneficial effects on intestinal microbial flora, mineral absorption, improving blood lipids, and preventing colon cancer. A new approach for advancing artichoke (<i>Cynara scolymus</i>) cultivation for the supply of raw materials for herbal medicine production, along with the significant inulin levels present in the plant's perennial roots, has encouraged researchers to evaluate artichoke alongside chicory and pickled potatoes for large-scale inulin extraction. In order to investigate the effect of the nutrition system (chemical, organic, and integrated) on the inulin content of artichoke roots at plant density levels (55000 and 100000 plant ha⁻¹), an experiment was conducted on 2022 at Tarbiat Modares University, Theran, Iran. In this experiment, aqueous extract of two-years-old artichoke roots of each treatment were evaluated. Several steps were performed to remove particles and colloidal materials such as pectin, protein, and cell wall materials, purify, precipitate, decolorize, and heat to concentrate to Brix 42 according to the method of Ehsani et al. (2). Analysis of variance of the data showed that the plant nutrition system did not have a significant effect on the inulin content of artichoke roots, but the main effect of plant density was highly significant. Means comparison indicated that sparse cultivation (55,000 plant ha⁻¹) was at the top with 4.43% inulin, and doubling the density resulted in a 22% decrease. Despite the non-significant interaction effect of density×nutrition, organic and integrated nutrition systems are recommended in accordance with sustainable agriculture guidelines, because artichokes at a density of 55,000 plants per hectare under organic and integrated nutrition systems had the highest inulin content with 4.65% and 4.48%, respectively.

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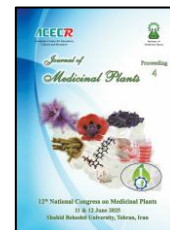
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Synergistic Phytotherapy and Nanotechnology: A Paradigm Shift in HPV-Positive Cervical Cancer Management

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ARTICLE INFO

Keywords:

HPV
Black carrot
Anthocyanins
Nanoemulsion
Apoptosis

ABSTRACT

Cervical cancer associated with human papillomavirus (HPV) is a significant worldwide health concern, with oncogenic HPV strains, especially HPV-16, facilitating malignant transformation via the viral oncoproteins E6 and E7. These proteins deactivate the tumor suppressors p53 and Rb, facilitating unregulated cell growth and immunological escape. This study used the TC-1 mouse cell line, which is a well-known model for HPV-positive cervical cancers, to explore the treatment possibilities of beneficial compounds from black carrots (*Daucus carota* subsp. *sativus* var. *atrorubens*). Anthocyanins from black carrots, especially those based on cyanidin, have shown significant antioxidant, anti-inflammatory, and anticancer effects, positioning them as potential agents for the suppression of HPV-related tumors. In this study, a nanoemulsion was developed to optimize the delivery of anthocyanin-rich black carrot (*Daucus carota* subsp. *sativus* var. *atrorubens*) bioactives for potential application in HPV-positive cervical cancer treatment. The extraction process involved dissolving 60 grams of black carrot biomass in 600 mL of acetone, followed by ultrasonic-assisted extraction at ~25°C for 30 minutes. The resulting suspension was centrifuged to remove insoluble components, yielding a purified anthocyanin-rich extract. For nanoemulsion preparation, the extract was dissolved in cold-pressed peanut oil, with Tween 80 serving as an emulsifier to stabilize the formulation. Tocopheryl polyethylene glycol succinate (TPGS, 0.5%) was incorporated at 45°C to enhance dispersion and improve bioactive retention. A two-phase oil-in-water system was then generated via sonication, ensuring uniform droplet formation. To further refine emulsification, 2.0 mL of deionized water was gradually introduced through ultrasonic homogenization. The resulting nanoemulsion exhibited precise size distribution and high encapsulation efficiency, which were confirmed using dynamic light scattering (DLS) and UV-visible spectroscopy. HPV-positive TC-1 cancer cells were exposed to increasing amounts of the nanoemulsion, and tests were done to check how many cells survived, whether apoptosis occurred, and if tumor suppressor genes were reactivated. The results indicated a dose-dependent reduction in cell viability, along with a notable increase in apoptotic markers, including caspase-3 and Bax. Additionally, gene expression profiling using qRT-PCR validated the reactivation of p53 function and the inhibition of pro-tumorigenic cytokines. The nanoemulsion demonstrated superior anticancer efficacy relative to non-encapsulated black carrot extract, underscoring the significance of tailored drug delivery methods in enhancing therapeutic results. This work highlights the promise of natural plant-derived chemicals in formulating innovative treatment strategies for HPV-positive cervical cancer. We provide a viable foundation for future translational research by combining bioinformatics-driven chemical selection with sophisticated nanotechnology to enhance therapy methods for HPV-induced cancers. Additional in vivo validation is necessary to investigate the systemic effectiveness and immunomodulatory properties of this nanoformulation.

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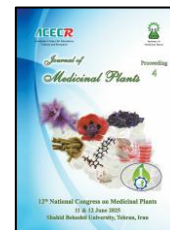
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Poster Presentation ID: 1110

Synergistic Targeting of Gastric Cancer: Integrating Systems Biology-Driven Biomarker Discovery with Nanoemulsion-Based Astaxanthin Therapy

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ARTICLE INFO

Keywords:

Gastric cancer
Nanoemulsion
Astaxanthin
Bioinformatics
Chemoinformatics

ABSTRACT

Gastric cancer continues to be a major factor in worldwide cancer mortality, mostly owing to its insidious early development and the restricted efficacy of standard treatments in late stages. This work integrated a systems biology approach with a novel nanoformulation to provide a customized therapy strategy for stomach cancer. Initially, we extracted transcriptome data from the TCGA-STAD datasets (n = 412 for cancer, n = 36 for normal) using sophisticated bioinformatics techniques. This study identified a set of hub genes and ceRNA networks that are significantly implicated in inflammation, cytokine signaling, and immunological dysregulation. Subsequently, we used virtual screening, pharmacophore modeling, and molecular docking to identify prospective bioactive chemicals that may modulate these molecular pathways. Gastric cancer was induced in six-week-old male C57BL/6 mice during the experimental phase by providing N-nitroso-N-methylurea (MNU) at a concentration of 244 ppm in drinking water for a duration of 10 weeks. Sixteen weeks after the cancer was induced, the mice were divided into five groups: one group was a normal control, one group received only MNU, one group was treated with chemotherapy using fluorouracil (5-FU; 10 mg/kg daily for seven days), one group received a nanoemulsion rich in astaxanthin from *Haematococcus pluvialis*, and the last group got both 5-FU and the nanoemulsion. A detailed study of the nanoemulsion using dynamic light scattering and UV-visible spectroscopy revealed that the droplet sizes were consistent and that it effectively contained astaxanthin, indicating that the body readily absorbs it. Quantitative RT-PCR analysis revealed that therapy with the astaxanthin nanoemulsion, whether administered alone or in conjunction with 5-FU, significantly altered critical gene expression patterns. Inflammatory mediators (e.g., IL-6 and IL-11) were significantly downregulated, whereas the expression of tumor suppressor genes was reinstated compared to the MNU-only group (p<0.05). Histopathological analysis of gastrointestinal tissue sections confirmed these results, demonstrating reduced cellular atypia, decreased tumor cell density, and reinstatement of normal glandular architecture. The combination of 5-FU with nanoemulsion had a synergistic effect, significantly decreasing tumor sizes more than each therapy individually, indicating an enhanced therapeutic index and the potential to improve treatment results. This comprehensive methodology, combining systems biology analytics with nanoengineering, elucidates the molecular abnormalities in stomach cancer and provides a possible pathway for targeted treatment. These results highlight the potential of natural bioactives administered by sophisticated nanoformulation to augment conventional chemotherapy, presenting a persuasive approach for enhancing early identification and treatment customization in gastric cancer.

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1. System biology analysis to develop diagnostic biomarkers, monitoring pathological indexes, and novel therapeutic approaches for immune targeting based on maggot bioactive compounds and polyphenolic cocktails in mice with gastric
2. Cancer the role of *Sparaxis latifolia* and Aerobic Exercise on Anti-inflammatory Activities and Regulation of Inflammatory Factors in the Intestine of Mice with Colon Cancer Under Chemotherapy
3. Mitigating Diabetic Cardiomyopathy: The Synergistic Potential of Sea Buckthorn and Metformin Explored via Bioinformatics and Chemoinformatics.



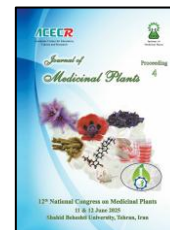
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Poster Presentation ID: 1115

Phytotoxic and Allelopathic Effects of Cinnamon Extract on Germination of Wheat, Barley, and Amaranth Seeds

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ARTICLE INFO	ABSTRACT
Keywords: Phenolic Content Flavonoid Content Germination Weed Bioherbicide	This study evaluated the effect of different concentrations of aqueous cinnamon (<i>Cinnamomum verum</i>) extract (0, 12.5, 25, 50, 75, and 100%) on the germination process of wheat (<i>Triticum aestivum</i>), barley (<i>Hordeum vulgare</i>), and amaranth (<i>Amaranthus retroflexus</i>) seeds. For extraction process, a ratio of 5 g cinnamon bark to 100 ml distilled water at room temperature was employed. The results showed that cinnamon extract significantly affected both germination percentage and germination rate. The highest germination was observed in wheat under control conditions, whereas the lowest germination was recorded in amaranth exposed to the highest extract concentration. Cinnamon extract exhibited strong inhibitory effects on amaranth germination but showed comparatively limited suppression in wheat and barley, highlighting its selective phytotoxic potential. Given that allelopathic activity is often linked to the presence of phenolic and flavonoid compounds [1-2], the total content of these bioactive compounds in the extract (100%) was quantified, yielding 560.39 µg/mL for phenolics and 86.77 µg/mL for flavonoids. These secondary metabolites are believed to inhibit seed germination through various mechanisms, including disruption of enzyme systems, alteration of membrane permeability, interference with protein synthesis, and inhibition of cell division [3]. The differential sensitivity observed among the tested species may be attributed to variations in seed coat structure, enzymatic defense systems, and inherent metabolic responses. The ecological advantages of using cinnamon extract include reduced risk of resistance development in weeds, environmental safety, non-toxicity to non-target organisms, and suitability for organic farming. These findings suggest that cinnamon extract could serve as a promising and sustainable botanical herbicide for weed management. Its natural origin and effective inhibitory properties offer an environmentally friendly alternative to conventional chemical herbicides, contributing to safer and more sustainable agricultural practices.

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Poster Presentation ID: 1116

The Effects of Curcumin on Skin Flap Survival in Mice: An Experimental Study

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ARTICLE INFO

Keywords:

Curcumin
Flap Survival
Angiogenesis

ABSTRACT

Skin flaps play a vital role in reconstructive surgeries. Necrosis of skin flaps remains a significant challenge in reconstructive surgery, largely due to ischemia and oxidative damage. Curcumin, a bioactive compound derived from *Curcuma longa*, is known for its potent antioxidant, anti-inflammatory, and angiogenesis promoting properties (1). This study investigates the potential of curcumin to improve the survival of ischemic random pattern skin flaps in a mouse model. Thirty adult male mice of the same strain were randomly assigned into three experimental groups (n=10 per group). All animals were anesthetized using an intraperitoneal injection of a standard anesthetic agent. Following a single dose of prophylactic antibiotic, a caudally based random-pattern dorsal skin flap (3 × 9 cm) was created in all animals, based on the modified McFarlane's method. In the control group, mice received an intraperitoneal injection of normal saline. In the vehicle group, mice were administered an intraperitoneal injection of a vehicle solution composed of dimethyl sulfoxide (DMSO) and corn oil. In the treatment group, curcumin was administered intraperitoneally at a dose of 25 mg/kg body weight, dissolved in the same DMSO/corn oil vehicle, once daily for 14 consecutive days. At the end of the two-week treatment period, the dorsal skin flaps were photographed using a digital imaging system under standardized conditions. The necrotic area of each flap was quantitatively analyzed based on photographic documentation. Administration of curcumin significantly enhanced skin flap viability and improved blood flow in the ischemic region compared to both the control and vehicle groups. Mice in the curcumin-treated group exhibited visibly reduced edema and a marked decrease in the necrotic surface area of the skin flaps. Histological and macroscopic evaluations revealed enhanced angiogenesis, reduced oxidative stress, and inhibition of apoptosis in the ischemic tissue. The reduction in necrosis in the curcumin group was statistically significant when compared to both the control and vehicle groups ($p < 0.05$), confirming the therapeutic efficacy of curcumin in promoting skin flap survival. Curcumin effectively enhanced the survival of random-pattern skin flaps in vivo by promoting angiogenesis, reducing oxidative stress, and inhibiting apoptosis. Overall, the findings of this study highlight the significant therapeutic potential of curcumin as a promising pharmacological agent for improving skin flap viability and supporting tissue regeneration in reconstructive surgery (2).

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Poster Presentation ID: 1117

Comparative Effects of Ginger and Ondansetron on Postoperative Nausea and Vomiting in Endoscopic Sinus Surgery: A Double-Blind Randomized Clinical Trial

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ARTICLE INFO

Keywords:

Ginger

Nausea

Vomiting

Sinus Surgery

ABSTRACT

Postoperative nausea and vomiting (PONV) are common and distressing complications of general anesthesia, second only to postoperative pain in terms of patient discomfort. This study aimed to compare the effectiveness of ginger and ondansetron in reducing the incidence and severity of PONV in patients undergoing endoscopic sinus surgery. In this double-blind, randomized clinical trial, 150 eligible patients scheduled for endoscopic sinus surgery were randomly assigned to one of three groups: ginger (n = 50), ondansetron (n = 50), or placebo (n = 50). One hour before surgery, patients received a single capsule containing either 500 mg ginger, 8 mg ondansetron, or placebo, accompanied by 25 mL of water. The severity of nausea and the frequency of vomiting were assessed at 1, 2, 4, and 8 hours postoperatively using standardized evaluation tools. Patients in the ginger group experienced a significantly lower severity of nausea and fewer episodes of vomiting at all measured postoperative intervals compared to the placebo group ($P < 0.05$). Compared to the ondansetron group, there was no statistically significant difference in vomiting frequency ($P > 0.05$); however, the severity of nausea was notably lower in the ginger group during the postoperative period ($P < 0.05$). Preoperative administration of ginger significantly reduced both the intensity of nausea and the frequency of vomiting in patients undergoing endoscopic sinus surgery. Given its comparable efficacy to ondansetron and its natural origin, ginger may serve as a safe and effective alternative for the prevention of PONV in clinical practice.

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Poster Presentation ID: 1120

Investigation of the Therapeutic Potential of *Medicago sativa* Extract in Hemophilia Management

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ARTICLE INFO	ABSTRACT
Keywords: <i>Medicago sativa</i> Hemophilia Prothrombin time Activated partial thromboplastin time	Hemophilia, a rare genetic disorder, severely disrupts blood clotting and remains a significant global health concern. Recent treatments have notably reduced mortality rates, with a 15% decline in hemophilic deaths over the last decade, especially where access to factor concentrates is improved. The main therapeutic approach involves replacing deficient clotting factors, but traditional methods, such as herbal remedies, are increasingly recognized for their potential benefits. Ongoing clinical trials are necessary to confirm the safety and effectiveness of these traditional approaches (1). <i>Medicago sativa</i>, known for its antioxidant, anti-inflammatory, and antimicrobial properties, plays a significant role in preventing and treating numerous health issues. In traditional medicine, this herb is utilized to enhance overall health, cleanse the blood, improve digestion, and control chronic diseases like diabetes and hypertension (2). The present study aimed to evaluate the coagulation activity of the methanolic extract of <i>M. sativa</i>. The plant extract was obtained by macerating the leaves of <i>M. sativa</i> in methanol for 72 hours. After filtration and drying in an oven, the extract with a concentration of 50 µg/mL was prepared to run in the <i>in vitro</i> assays of prothrombin time (PT) and activated partial thromboplastin time (APTT). The obtained results indicated that the methanolic extract significantly influenced coagulation times with 19 and 34 for PT and APTT respectively. The results suggest that the methanolic extract of <i>M. sativa</i> positively influences the extrinsic coagulation pathway.

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Poster Presentation ID: 1121

The Role of Bistort in Bleeding Management: Anticoagulant Properties and Natural Remedies

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ARTICLE INFO	ABSTRACT
Keywords: <i>Polygonum bistorta</i> Anticoagulation Prothrombin time Activated partial Thromboplastin time	<i>Polygonum bistorta</i> (bistort) is an astringent plant traditionally used in herbal medicine to control bleeding, particularly hemorrhoids. Its primary components, including tannins, flavonoids, and saponins, help reduce inflammation and improve the coagulation process (1). The root of this plant, due to its high tannin content, is beneficial for treating various internal and external bleeding disorders, diarrhea, and urinary tract diseases. The ethyl acetate fraction of <i>P. bistorta</i> is one such remedy that has demonstrated effectiveness in enhancing coagulation and shortening bleeding time. The extraction of <i>P. bistorta</i> involved soaking it in ethyl acetate for 72 hours, followed by concentration and drying (2). Different concentrations of the extract (25, 50, 250, 500 ppm) were evaluated using prothrombin time (PT) and activated partial thromboplastin time (APTT) tests. Results showed that the ethyl acetate extract significantly influenced APTT and PT coagulation times, particularly at 25 ppm, indicating that its compounds affect both the internal and external coagulation pathways. In summary, exploring traditional medicines like <i>P. bistorta</i> presents promising potential as an effective anticoagulant for complementary treatment strategies.

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Poster Presentation ID: 1122

Use of Olive Oil Extraction By-products as Ruminant Feed: Impacts on Dairy Products and Meat Quality, Animal Welfare and Feeding Cost

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ARTICLE INFO	ABSTRACT
Keywords: Olive <i>Olea europaea</i> Ruminant Olive agro-residues Livestock	Olive oil extraction generates large quantities of by-products, including olive leaves and pomace. Disposal of these agro-residues is a great environmental concern. As they are rich sources of nutrients and bioactive compounds such as polyphenols, their use as forage could be a feasible solution. This research aims to discuss the most recent data about the impact of olive agro-residues as ruminants feed on dairy and meat quality as well as animal welfare and feeding cost. The search was conducted on PubMed database using the keywords ((olive) OR (<i>Olea europaea</i>)) AND ((ruminant) OR (livestock)). The abstracts and full-texts of articles published between 2015-2025 were reviewed. Studies providing only in vitro data or using olive oil extraction by-products in combination with other agro-residues and articles with no available full-text were excluded. Generally, the nutritional value of dairy products of the livestock fed on olive agro-residues has improved. There was an increase in beneficial fatty acids and a decrease in saturated fatty acids, and hence a decrease in atherogenic and thrombogenic indexes of dairy products. Milk phenolic content, volatile profile, and oxidative stability have been improved. The results about milk yield are mixed. Some studies have shown a rise in meat monounsaturated fatty acids and antioxidant capacity while no detrimental effect has been observed on meat quality. There has been an improvement in liver and spleen detoxifying enzymes as well as tissue antioxidant capacity and to some extent the ruminal microbiota. No detrimental effect has been observed in growth performance, digestibility, and blood variables. The feeding costs have been decreased by up to 20% (2, 3). In conclusion, use of olive agro-residues as forage seems an environmentally and economically efficient approach. Further research is required to standardise the livestock diet containing olive oil extraction by-products.

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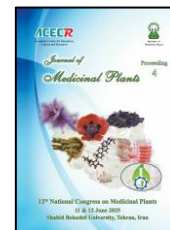
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Poster Presentation ID: 1123

Evaluation of the effect of a commercial herbal product on virus detection period in trachea and caecal tonsils of broilers with experimental viral respiratory complex

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ARTICLE INFO

Keywords:

Avian influenza
Infectious Bronchitis
Herbal drug
Broiler

ABSTRACT

Introduction: Respiratory viral infections, particularly those involving mixed infections of H9N2 avian influenza virus (AIV) and infectious bronchitis virus (IBV), are common in commercial poultry flocks (Hassan et al., 2016; Seifi et al., 2010). Despite the absence of common use of antiviral drugs in poultry production, herbal remedies are often used to alleviate respiratory symptoms. **Aim:** This study aimed to assess whether a herbal preparation (Aromax®), containing eucalyptus oil, mint oil, L-menthol, and thyme oil, influences the virus detection period in the trachea and caecal tonsils of broilers infected with H9N2 and a variant IBV (793/B serotype). **Methods:** A total of 105 broilers, 25 days old, were allocated to three groups: NC (negative control), PC (positive control – virus challenged intranasally and through eye drop without treatment), and AR (virus challenged and treated with Aromax® at 200 mL/1000 mL drinking water twice daily for 5 days from day 2 post-infection). Five birds from each group were euthanized on days 3, 6, 9, and 12 post-challenge, and tracheal and caecal tonsil samples were collected for RT-PCR virus detection. **Results:** In the PC group, viruses in tracheal samples were detected in 2/5 and 1/5 birds on days 3 and 6 post-challenge, respectively, and all became negative by day 9. Caecal tonsils were positive in 1/5, 3/5, and 1/5 birds on days 3, 6, and 9, respectively, turning negative by day 12. The AR group showed almost a similar virus detection pattern, and no significant difference was found between the PC and AR groups ($p > 0.05$, Fisher's exact test). **Conclusion:** Aromax® did not alter the virus detection period in tracheal or caecal tissues. Further studies are required to determine its effects on viral load and potential prophylactic use in poultry. potential of lycopene supplementation for preserving male fertility in individuals exposed to high glucocorticoid levels.

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Synergistic Effect of Resveratrol loaded Nanoparticles and Copper Ions on Alpha Synuclein Fibrillation

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ARTICLE INFO	ABSTRACT
Keywords: Alpha-synuclein Resveratrol Copper Parkinson's disease	Alpha-synuclein (α-syn) fibrillation plays a central role in the pathogenesis of Parkinson's disease (PD), making it a key target for therapeutic intervention. Resveratrol, a natural polyphenol with antioxidant and anti-amyloidogenic properties, has been shown to inhibit α-syn fibrillation and mitigate its cytotoxic effects. Conversely, metal ions particularly copper ions (Cu^{2+}) are known to modulate α-syn aggregation, often accelerating fibril formation and increasing toxicity. In this study, we investigated the combined effect of Cu^{2+} and Resveratrol on α-syn fibrillation kinetics and morphology with using a Thioflavin T fluorescence assay and fluorescence microscopy. Although in the presence of Resveratrol loaded nanoparticle, this aggregation was markedly reduced, we observed that Cu^{2+} alone significantly accelerated fibrillation and promoted the formation fibrils. However, notably, the co-treatment exhibited a synergistic effect, where Resveratrol not only counteracted Cu^{2+} -induced aggregation but also modulated the fibril morphology toward amorphous aggregates. These findings suggest that Resveratrol and Cu^{2+} may alter fibril formation process of α-syn, thereby mitigating their pro-aggregation influence. This synergistic interplay highlights the potential of combining metal-modulating agents with natural polyphenols as a therapeutic strategy to inhibit pathological α-syn aggregation in PD and enables the use of lower drug concentration, which is important for reducing cytotoxicity, minimizing off-target effects, and enhancing overall therapeutic selectivity.

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Poster Presentation ID: 1127

Modulating Silymarin Absorption Using Metal-Organic Materials MIL-101

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ARTICLE INFO

Keywords:

MOFs

Drug Delivery

Antioxidant

Silymarin

Drug carrier

ABSTRACT

Metal-organic frameworks have gained ground in recent years as materials for drug delivery systems due to their biodegradability and multifunctionality as porous nanomaterials (1). These materials have pores in the inorganic material and a large volume of their structure is occupied by void space. Among the thousands of MOFs, MIL-101 has a more regular porosity and has been used in drug delivery systems due to its unique properties such as large pores, high drug uptake and optical or magnetic properties, as well as controlled drug release systems. Silybin is the most abundant component in silymarin, which acts as an antioxidant and hepatoprotector and is soluble in water, providing low bioavailability and short half-life of the drug(2). The MOFs containing the drug silymarin were characterized by scanning electron microscopy, transmission electron microscopy, high-resolution transmission electron microscopy, energy dispersive X-ray spectroscopy, and X-ray diffraction. The results showed that the incorporation of silymarin into the MOFs was significantly higher than that of the conventional drug silymarin and the studies reported the lack of cytotoxicity of the drug carrier.

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Poster Presentation ID: 1128

Effects of mulch on reducing water consumption and increasing yield of garden thyme (*Thymus vulgaris* L.)

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ARTICLE INFO	ABSTRACT
Keywords: Mulch Water consumption Yield Garden thyme	Thyme is an aromatic plant from the mint family and is a valuable medicinal plant and widely used in the pharmaceutical and food industries due to its thymol and carvacrol compounds. This plant is native to the western Mediterranean and southern Italy (Emam, 2008). Drought stress is one of the most important environmental stresses limiting plant production worldwide, especially in arid and semi-arid regions (Al et Omid, 2012). The use of mulch in a sustainable agricultural system is one of the appropriate solutions for maintaining ecological laws. Mulch can be considered a factor affecting soil properties because many of the properties and conditions of the soil, including soil moisture, permeability, evaporation rate, soil temperature, heat conduction and retention rate, nutrients, denitrification, mineral solubility, soil organisms and microbes in the soil, and soil salinity are affected by mulches through washing and evaporation control (Kuchaki et al., 2015). In an experiment conducted in 2013 to investigate the effects of plastic mulch on garden thyme in Maneh County, North Khorasan Province, the treatments used included the use of plastic mulch and the lack of use of plastic mulch with 3 replications. Garden thyme was cultivated in row cultivation with a row spacing of 40 cm and a row spacing of 20 cm. Irrigation was drip irrigation with a tape, and the tape was placed under the plastic, and holes were made at the planting site for planting, and the seedlings were cultivated in the ground. The results showed that plastic mulch reduced the weed population in the field, maintained more moisture around the plant, and ultimately increased yield. The reduction in weed population is due to the inability of weeds to grow under the plastic, which prevents the nutrients in the soil from being used for weed growth, and as a result, more nutrients are available for thyme. This increases the growth and yield of thyme. Plastic mulch also reduced water evaporation from the soil, which results in more moisture being retained in the soil, which in turn reduces water consumption.

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Poster Presentation ID: 1129

Introduction of the Peel of Iranian Pomegranate as a Natural Food Additive by a Comprehensive Phytochemical-Based Characterization of Different Genotypes

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ARTICLE INFO

Keywords:

Pomegranate

Genotypes

Peel

Polyphenol

Food additive

ABSTRACT

Over the past years, there has been a growing demand from the food industry for additives from natural sources as an alternative to synthetic ingredients [1]. This study aimed to evaluate the potential of pomegranate peel powder as a natural preservative. Many factors including genotype could affect the quality of pomegranate (*Punica granatum* L.) peel as a by-product of juice production with many nutritional, functional and anti-infective properties [2]. Looking for the most significant phytochemical characters among thirty Iranian pomegranate peels (IPP) from different genotypes and nine major metabolites were determined. Next, the HPLC-DAD-MS results of pomegranate peel extracts revealed nine phenolic compounds in the IPP extracts. Punicalagin β , punicalagin α , and ellagic acid were the main components which constituted 20.8–48.7, 13.9–30.1, and 1.6–13.4 $\mu\text{g}/\text{mg}$ DW of the extracts, respectively. The peel of IPP23 (Kabdar-Shirin-e- Behshahr) contained the highest quantity of polyphenolic compounds. Eventually, antioxidant potential measured via the DPPH assay was ranged between 4.1 and 14.4 $\mu\text{g}/\text{ml}$. The results show that the antioxidant property of pomegranate peel extracts is significantly higher than the standard of gallic acid. Also, the potential genotypes as source of peels with high nutritional value are revealed. Eventually, among the examined genotypes, the peel of IPP23 can be introduced as a potential source of natural preservatives in food industry.

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Poster Presentation ID: 1130

Stability and Quality Assessment of Pomegranate Seed Oil Under Various Storage Conditions

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ARTICLE INFO

Keywords:

Pomegranate Seed oil
Punicic acid
Oil stability
Oxidation tests
Storage conditions

ABSTRACT

Punica granatum L., an ancient and well-known horticultural fruit native to Iran and the Himalayas in northern India. Pomegranate seed oil (PSO) considered one of the main agro-industry food by-products. PSO as a rich source of omega-5 conjugated fatty acids has numerous applications in the food, pharmaceutical and cosmetic industries, although its use has been limited due to the low stability of PSO [1]. This study aims to evaluate the effects of oxidation factors such as oxygen, sunlight, temperature (4,20,62°C) on the quality and stability of PSO during a week. Stability of PSO samples was assessed by measuring peroxide value (PV), acid value (AV) and p-anisidine value (p-AV) [2]. Fatty acid profile of PSO samples were also examined using Gas chromatography and ¹HNMR. Based on the experimental data, room temperature storage away from sunlight and air (to minimize oxygen exposure) is recommended as the best condition for preserving oil quality. This study provides fundamental information on the potential of pomegranate seed oil as a valuable food by-product and outlines technical requirements applicable to the food industry.

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Poster Presentation ID: 1131

A Comprehensive Fatty Acids Profiling in the Pomegranate Seed Oil of Thirty Iranian Pomegranate Cultivars

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ARTICLE INFO

Keywords:

Pomegranate
Punicic acid
Seed oil
Fatty acid
Punicic acid

ABSTRACT

Pomegranate (*Punica granatum* L.), as a medicinal and nutritional ancient fruit, belongs to the Punicaceae family, and is an ancient and well-known horticultural crop that is widely grown in Iran [1]. So, it is necessary to investigate the diversity of some commercial pomegranate cultivars of Iran to be aware of their potential. Ultrasonic-assisted extraction was used for the extraction of oil from pomegranate seeds in hexane, and the oil efficiency was determined between 9.1 to 11.0 %. Nine fatty acids were identified and quantified in thirty different pomegranate cultivars. Punicic acid, a conjugated linolenic acid was the main fatty acid containing 25.9-66.9 % of seed oils. The saturated and polyunsaturated acids contents ranged from 8.3-18.8 % and 81.2-91.7 %, respectively. Iranian pomegranate cultivars, especially Togh-Gardani-e-Yazdi, and Sefeed-Poust-Khosk-e-Bafgh, could be a good source of essential fatty acids such as punicic and conjugated linolenic acids, increasing the nutritional potential and health benefits. The anti-inflammatory and anti-cancer properties of punicic acid in pomegranate seed oil make it a valuable compound for body health [2].

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Poster Presentation ID: 1132

The inhibitory potential of dog rose (*Rosa canina* L.) hips extract on *Vitis vinifera* polyphenol oxidase

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ARTICLE INFO

Keywords:

Grape
Polyphenol oxidase
PPO inhibitor
Dog Rose hip
Natural anti-browning
agents

ABSTRACT

Grapes are among the world's most economically significant fruit crops, valued for their nutritional richness and diverse by-products (table grapes, raisins, juice, etc.). They are also enriched sources of bioactive phenolic compounds such as flavonoids and stilbenes, exhibiting high antioxidant capacity and health-promoting properties (1). Given rising demand for healthy foods, maintaining grape quality post-harvest is critical. Enzymatic browning, mediated by polyphenol oxidase (PPO), degrades phenolic compounds and reduces marketability and nutritional value. Due to the toxicity of synthetic PPO inhibitors, natural alternatives are increasingly sought after (1). Dog rose (*Rosa canina* L.), a well-known medicinal plant, has demonstrated therapeutic effects against inflammation, stomach ulcer, arthritis, rheumatism, gout and sciatica disorders, attributed to its high phenolic and antioxidant content (2). Given these properties, this study aimed to investigate the efficacy of *R. canina* hips extract as a natural inhibitor for the grape PPO activity. Consequently, PPO was extracted from white seedless grape (*Vitis vinifera*) berries and subjected to preliminary examinations to obtain optimal conditions for its catecholase activity using caffeic acid as the substrate (3). Then, the activity was measured in the absence ($44.25 \pm 0.94 \mu\text{M min}^{-1} \text{g}^{-1} \text{FW}$) and presence different amounts of the *R. canina* hips extract. The resulting inhibition kinetics data were analyzed via Lineweaver–Burk plot. The aqueous extract exhibited dose-dependent inhibition ($\text{IC}_{50} = 0.8 \text{ mg mL}^{-1}$), confirming the mild ability to suppress the grape PPO activity. These findings highlight rose hips extract as a viable, natural PPO inhibitor to enhance grape shelf-life and meet clean-label consumer preferences.

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Poster Presentation ID: 1134

Cryogenic Grinding Pretreatment and Ultrasound-assisted Extraction of Crocin from Saffron (*Crocus sativus* L.) Stigmas using Water as Solvent

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ARTICLE INFO	ABSTRACT
Keywords: Saffron Crocine Cryogenic grinding Ultrasonic extraction Antioxidant capacity	Medicinal plants have been recognized by researchers as a valuable solution for treatment due to the side effects of chemical drugs. According to the WHO report, approximately 80% of population in developing countries use these plants for treatment. Saffron (<i>Crocus sativus</i> L.) is a highly valued medicinal plant that has been used in therapeutic and culinary applications for centuries. Crocin, a hydrophilic apocarotenoid, is the most abundant bioactive component in saffron, which has high antioxidant and anticancer properties by scavenging free radicals. Furthermore, this component is widely used as a colorant in food and pharmaceutical industries [1]. Saffron renowned for its color, antioxidant properties, and valuable bioactive compounds has been traditionally processed using methods that may not fully preserve these essential qualities. As such, modern technologies like cryogenic grinding, with liquid nitrogen at -196 °C, are gaining attention [2]. In the present study, this technology was introduced as pretreatment method, ensuring better preservation of mentioned vital components of saffron and their properties using water as conventional extraction solvent. Beside the high efficient cryogenic grinding pretreatment, ultrasound-assisted extraction (UAE) is a simple, short extraction, and economical method for extraction of bioactive compounds using the cavitation phenomenon [3]. In this study, the UAE of 0.1 mm cryomilled saffron using water as a green solvent was conducted at 200 W ultrasonic power and the extraction time of 10 min in ambient temperature. The values for crocin yield, total phenolic content (TPC), antioxidant capacity (IC ₅₀), and coloring strength of saffron extracts were 146.97 mg/g DW, 90.26 mg GAE/g DW, 3.828 mg/mL, and 479.316, respectively. Overall, this study combines cryogenic and UAE-water methods as green and sustainable approach for extraction of crocin and TPC from saffron with high antioxidant capacity, which can be a good candidate for diverse applications in industries.

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Poster Presentation ID: 1135

Utilization of Hemp Stalk Byproduct as a Natural Adsorbent for Aflatoxin B1 Mitigation

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ARTICLE INFO

Keywords:

Aflatoxin B1
Hemp stalk
Mycotoxin adsorption
Phosphate/acetate
buffer

ABSTRACT

Aflatoxin B1 (AFB1), as a dangerous mycotoxin, poses a threat to human and animal health (1). Although few compounds have been introduced for the adsorption of aflatoxin and reducing its risks, the use of natural organic adsorbents has gained attention as a safe and accessible approach for aflatoxin removal (2). This study aimed to evaluate the efficiency of different concentrations of hemp (*Cannabis sativa* L.) stalk powder as a natural adsorbent in removing AFB1 from aqueous solutions. The effect of varying amounts of hemp stalk powder (1.0, 3.0, and 5.0 g/L) on the adsorption of AFB1 (1 mg/L) was investigated in phosphate buffer (pH 7.0) and acetate buffer (pH 5.0) after two hours of incubation on a shaker at 39°C, based on a factorial design in a completely randomized layout. The remaining AFB1 after the adsorption process was measured using high-performance liquid chromatography (HPLC). The results showed a significant difference in AFB1 adsorption among different amounts of hemp stalk powder, while no significant difference was observed between the two buffers. The highest aflatoxin adsorption was achieved at an adsorbent-to-toxin ratio of 5000:1, demonstrating remarkable efficiency with 96% and 94.3% reduction of aflatoxin in phosphate and acetate buffers, respectively. An adsorbent-to-toxin ratio of 3000:1 also led to 82.5% to 82.8% reduction in aflatoxin. Finally, this research highlights the potential of hemp agricultural residues as a rich source of fiber and cellulosic compounds for use as an effective and cost-efficient adsorbent in removing AFB1.

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Poster Presentation ID: 1136

Induction of Hairy Roots in *Cannabis sativa* Using Different Strains of *Agrobacterium rhizogenes*

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ARTICLE INFO

Keywords:

Agrobacterium
rhizogenes
Cannabis sativa
Hairy root

ABSTRACT

Hairy roots, as one of the valuable potentials for the production of secondary metabolites, hold significant importance in the pharmaceutical, agricultural, and food industries. *Cannabis sativa*, due to its valuable medicinal compounds, is considered one of the medicinal plants with high potential for secondary metabolite production. In this study, the induction of hairy roots was investigated using different strains of *Agrobacterium rhizogenes*, including A4, R1000, ATCC15834, and 1724, through the co-cultivation method. Among the tested strains, ATCC15834 and 1724 successfully induced hairy root formation in *C. sativa* explants. The induction frequency for ATCC15834 was 68.3%, while for strain 1724, it was 61.5%. In contrast, no root induction was observed with A4 and R1000 strains. The average number of roots per explant in responsive strains ranged between 3.4 ± 0.6 and 4.1 ± 0.7 . These results demonstrate the efficiency of specific bacterial strains in triggering hairy root development and suggest a strain-dependent response in *Cannabis sativa*. These findings highlight the prominent role of biotechnological methods in enhancing the production process of medicinal compounds from plants. This study demonstrates the high potential of biotechnology techniques in improving the production of economically valuable pharmaceutical metabolites. The development of this technology, especially in valuable plants such as cannabis, can offer a novel approach for the sustainable supply of pharmaceutical raw materials and reduce dependence on limited natural resources. Moreover, the application of this method on an industrial scale, in addition to the economic production of medicinal compounds, significantly contributes to the preservation of biodiversity and the sustainable use of natural resources.

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Poster Presentation ID: 1137

Salinity-induced physiological changes in peppermint (*Mentha piperita* L.) plants in relation to melatonin treatment

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ARTICLE INFO

Keywords:

Abiotic stress
Melatonin
Peppermint
Chlorophyll
Ion leakage

ABSTRACT

Peppermint (*Mentha piperita* L.) is an aromatic, perennial herbaceous plant belonging to the Lamiaceae (mint) family, which is widely used in food and pharmaceutical industries due to its therapeutic antimicrobial and antioxidant properties. This study investigated the role of melatonin (N-acetyl-5-methoxytryptamine), a phytohormone and multifunctional molecule present in all living organisms that plays a fundamental role in abiotic stress tolerance, in mitigating salinity stress in peppermint. This experiment was conducted as a factorial study based on a completely randomized design with three replications, including four salinity stress levels (0, 2, 4, and 6 dS/m) and four melatonin concentrations (0, 50, 100, and 150 μ M). Plants were grown under controlled greenhouse condition. Foliar applications were initiated at the 6-leaf stage and repeated weekly for 4 weeks. The measured traits included ion leakage, relative water content (RWC), and photosynthetic pigments (chlorophyll a, chlorophyll b, and carotenoids) as key physiological indicators. Results revealed significant interaction effects between salinity and melatonin. The results demonstrated that the highest total chlorophyll (Chl ab) contents (4.04 mg/g fresh leaf weight) and the maximum RWC (66.49%) were achieved under melatonin treatment. Given the significant improvement in physiological indices under salinity stress, foliar application of melatonin at 100 μ M can be recommended as an effective strategy to enhance salt stress tolerance in peppermint plants.

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Poster Presentation ID: 1138

Morphological Diversity and Essential Oil Content of Some *Perovskia* Species Growing in Markazi Province

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ARTICLE INFO

Keywords:

Dry biomass

Phytochemical
variation

Perovskia abrotanoides

Lamiaceae

ABSTRACT

Perovskia (commonly known as Brazambal), a member of the Lamiaceae family, is a wild-growing plant native to cold and arid mountainous regions. This study aimed to collect native *Perovskia* ecotypes and evaluate their morphological characteristics and essential oil content. Phenotypic diversity was assessed across 60 ecotypes from three species—*Perovskia atriplicifolia*, *P. artemisioides*, and *P. abrotanoides*—based on 17 morphological and phytochemical traits, including essential oil percentage. Key findings revealed that *P. artemisioides* exhibited the highest values for plant height, number of flowering branches, and fresh/dry biomass. Simple correlation analysis indicated significant positive and negative relationships among measured traits. Cluster analysis at a Euclidean distance of 5 grouped the ecotypes into three major clusters, with dry biomass, fresh biomass, and flowering branch number being the most discriminating factors. Essential oil content ranged from 1.6% to 2.1%, with *P. abrotanoides* showing the highest concentration (2.1%). These results highlight the intraspecific variability of *Perovskia* species, providing valuable insights for conservation and potential agricultural or pharmaceutical applications.

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Study of Morphological Diversity in Some Populations of the Iranian Medicinal Plant Golpar (*Heracleum persicum*)

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ARTICLE INFO

Keywords:

Heracleum persicum

Phenotypic diversity

Dry biomass

Apiaceae

ABSTRACT

Heracleum persicum (Persian hogweed), a perennial species with thick stems, represents a large genus in the Apiaceae family comprising 90-120 species. This medicinally important plant exhibits therapeutic properties primarily in its aerial parts, particularly leaves and fruits. In Iran, *H. persicum* serves multiple purposes: as a traditional medicine (carminative, anthelmintic, analgesic, and anti-inflammatory), culinary spice, livestock fodder, and source of bioactive compounds. Phytochemical analyses reveal its essential oils contain anethole and terpinolene (antifungal), beta-pinene (antibacterial), hexyl butyrate/octyl acetate (antimicrobial), and furanocoumarins (photoprotective). Our investigation of 3 populations (Qazvin, Tehran, West Azerbaijan) demonstrated significant morphological variation (ANOVA, $p < 0.05$). The Tehran population outperformed others in all metrics: stem length (150.25 cm), fresh/dry weights (331/134.88 g), leaf dimensions (22.38/15.75 cm), and inflorescence number (3.88). Qazvin showed intermediate values, while West Azerbaijan consistently displayed the lowest measurements. These phenotypic differences likely reflect genetic potential and/or environmental adaptation, with the Tehran population emerging as particularly promising for breeding programs and commercial cultivation. The findings provide critical baseline data for future studies on genetic resource management, genotype selection, and ecophysiological research in this economically and medicinally valuable species.

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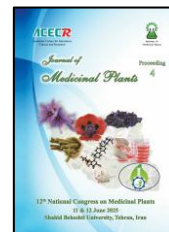
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Poster Presentation ID: 1140

Evaluation of Different *Agrobacterium rhizogenes* Strains on Hairy Root Induction in Khatooni Melon (*Cucumis melo* var. Khatooni)

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ARTICLE INFO

Keywords:

Cucumis melo

*Agrobacterium-
rhizogenes*

Hairy roots

Peroxidase

ABSTRACT

Khatooni melon (*Cucumis melo* var. Khatooni) is an endogenous Iranian cultivar with significant agricultural value. In addition to its importance as a crop, it contains valuable bioactive compounds such as elaterin, stigmasterol, carotenoids and peroxidase as well as cucurbitacin B as effective antioxidant and anticancer agents, making it a promising candidate for pharmaceutical and biotechnological applications. Hairy root induction using *Agrobacterium rhizogenes* is considered an efficient method for enhancing the production of such secondary metabolites. This study aimed to evaluate the effect of different *A. rhizogenes* strains on hairy root induction in explants of Khatooni melon. Cotyledonary explants were inoculated with A4, ATCC15834, and A13 strains, and parameters such as rooting percentage and number of roots per explant were assessed. The results indicated that the ATCC15834 strain had the highest efficiency in inducing hairy roots and significantly outperformed the other strains. These findings suggest that optimizing hairy root cultures in native plants such as Khatooni melon can be a valuable approach for enhancing the production of plant-derived bioactive compounds.

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Poster Presentation ID: 1142

Synergistic Evaluation of the Selected "Borneol-Farnesol-Carvone" Combination with Penicillin G and Imipenem against Antibiotic-Resistant *Pseudomonas aeruginosa* and *Staphylococcus aureus*

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ARTICLE INFO	ABSTRACT
Keywords: Imipenem Farnesol Carvone Borneol 3D Microdilution Assay	The global rise of antibiotic resistance, particularly among nosocomial pathogens such as <i>Pseudomonas aeruginosa</i> and methicillin-resistant <i>Staphylococcus aureus</i> (MRSA), necessitates the development of novel treatment strategies (1). Previous studies demonstrating the antimicrobial properties of terpenoids (2) prompted us to investigate the interactions between two antibiotics with reduced efficacy (Penicillin G and Imipenem) and three terpenoid compounds (Carvone, Borneol, and Farnesol) against clinically isolated strains of MRSA and <i>Pseudomonas aeruginosa</i>, with the objective of identifying potential synergistic effects. Antibacterial activity and synergism were assessed using the Three-Dimensional Microdilution Assay and interpretation of Fractional Inhibitory Concentration Index (FICI) values. MIC values were compared against Clinical and Laboratory Standards Institute (CLSI) breakpoints to determine bacterial susceptibility. The combination of Imipenem with either Farnesol or Borneol showed no synergistic effect (FICI > 0.5) against clinical isolates of <i>P. aeruginosa</i>, indicating limited benefit in combining these phytochemicals with carbapenem therapy for this organism. In contrast, significant synergism was observed between Penicillin G and Farnesol against both clinical and standard MRSA strains (FICI ≤ 0.5). This combination led to a pronounced reduction in MIC values of Penicillin G, shifting resistance profiles toward susceptibility. Further evaluation revealed that synergism persisted at low concentrations of Farnesol (≤ 0.12 µg/mL), suggesting strong potentiating effects even within the sensitive range. No synergistic interaction was detected between Penicillin G and Carvone (FICI > 0.5), nor was there any added benefit from combining Carvone with other agents in this study. These results support further in vivo toxicological and pharmacodynamic studies of the Farnesol-Penicillin G combination as a potential alternative or adjunct treatment for MRSA infections.

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Poster Presentation ID: 1143

Changing The Cultivation Pattern to Saffron, A Solution To Mitigate The Effects Of Climate Change (Case Study: Farmers of The Neyshabur Irrigation Association)

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ARTICLE INFO	ABSTRACT
Keywords: Cropping pattern Correlation coefficient Saffron	The occurrence of climate change is a proven fact for many researchers (Shi et al., 2020). Therefore, reducing its consequences on agriculture is necessary and essential. In order to investigate the management practices of farmers in the Neyshabur plain in order to examine their measures to adapt/reduce the effects of climate change, a questionnaire was prepared and information was collected from 100 farmers randomly and face to face. The management practices extracted from the questionnaire were classified into four classes of adaptation/reduction of climate change consequences, which were provided by the IPCC. The significance of farmers' practices was statistically compared using the Chi-square test, and the correlation between the same indicators was examined using the Spearman correlation test. The results of the questionnaire showed that farmers use organic fertilizers, conservation tillage, change the crop pattern towards perennial plants such as saffron, and return plant residues to the soil with the aim of improving fertility. The results showed that 21 percent of farmers have chosen saffron cultivation as their main crop, and 95 percent of them are under 50 years old. Since water is the most important limiting factor for agriculture in the Neyshabur plain, changing the cropping pattern to saffron cultivation is one of the methods that farmers used to increase water productivity. In general, it can be concluded that by focusing on ecologically adaptive measures and integrating with new sciences, as well as changing the cropping pattern towards perennial and water-intensive plants such as saffron, positive steps can be taken to reduce/adapt to the effects of climate change.

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Poster Presentation ID: 1144

Phytochemical Constituents, Antidiabetic and Antioxidant Activities of Oleo-Gum Resin from *Ferula latisecta*

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ARTICLE INFO

Keywords:

Koma

Resin

Phenolic contents

Flavonoid contents

ABSTRACT

This study aimed to conduct a comprehensive phytochemical investigation into the antioxidant and antidiabetic properties of the oleo-gum resin derived from *Ferula latisecta*. Sequential extraction using hexane, ethyl acetate, and methanol was employed to obtain distinct extracts from the resin. The antidiabetic potential of these extracts was assessed via inhibition assays targeting the α -amylase and α -glucosidase enzymes. Antioxidant activity was evaluated through the DPPH free radical scavenging method. Additionally, the total phenolic and flavonoid contents of each extract were quantified. Among the tested extracts, the ethyl acetate fraction demonstrated the most potent α -amylase inhibitory activity (33.32%), whereas the hexane extract exhibited the strongest inhibition of α -glucosidase (30.41%). The ethyl acetate extract also displayed notable antioxidant activity, with an IC_{50} value of 335.69 μ g/mL. Furthermore, it contained the highest concentration of phenolic compounds, measured at 92.97 mg of gallic acid equivalents per gram of extract. These findings suggested that the oleo-gum resin of *F. latisecta* was a rich source of phenolic constituents and exhibited significant antioxidant and antidiabetic activities. Given these promising results, further studies were warranted to explore its potential as a natural therapeutic agent.

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Poster Presentation ID: 1146

Investigation of Molecular Distinctions between Turmeric and Ginger through Differential Gene Correlation Analysis

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ARTICLE INFO

Keywords:

Turmeric

Ginger

Microarray

Gene Correlation

ABSTRACT

The current study investigates and compares the gene expression patterns of two species, turmeric (*Curcuma longa*) and ginger (*Zingiber officinale*), which are plants of considerable medicinal and economic significance [1]. The structural and physiological differences between these two species may be due to variations in their gene expression patterns. This research employs microarray data for gene expression patterns and differential gene correlation analysis. Gene expression data were extracted from the NCBI database under accession number GSE16982 and subsequently filtered. The data were analyzed using a linear model designed in the limma package [2] in R. Using the contrast method, differences in gene expression between the two species were calculated and adjusted with the eBayes method. Then, the identified differentially expressed gene data were used as input for correlation analysis employing the DGCA package [3]. The first five pairs of genes with the lowest pValDiff values and significant differences in gene expression correlation between turmeric and ginger were selected. In most cases, the direction of correlation was different between the two species, showing significant differences in the gene correlation patterns. For example, the gene pair pGT1_00695_01 (Hypothetical protein) and pGT1_13603_01 (unknown gene) showed a complete negative correlation in turmeric and a positive correlation in ginger. These results indicate that the organization and patterns of gene expression between the two studied species are significantly different, which may relate to the biological and functional differences of the plants. These genes could be responsible for morphological, physiological, or chemical differences between the two species. Additionally, by identifying genes that are regulated differently in each species, biological pathways such as the production of specific metabolites unique to each plant can be elucidated.

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Poster Presentation ID: 1147

Identification of Key Differential Genes Distinguishing Turmeric and Ginger Using Correlation-Based Feature Selection and Random Forest Modeling

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ARTICLE INFO

Keywords:

Correlation-Based
Selection
Species Differentiation
Classification
Modeling

ABSTRACT

Turmeric and ginger are important members of the Zingiberaceae family with wide medicinal and economic uses, traditionally applied in medicine and various industries. Although they look similar, these two species differ significantly in rhizome structure, chemical composition, and physiological responses [1]. Due to their biological complexity and molecular differences, advanced gene expression analysis methods, such as Correlation-based Feature Selection (CFS) [2] and machine learning algorithms such as Random Forest, play a key role in accurately identifying genes responsible for these differences. This study aims to identify differential genes that distinguish turmeric and ginger using CFS and Random Forest classification modeling. Gene expression data for turmeric and ginger were retrieved from the NCBI database (GSE16982). Samples included rhizomes, roots, and leaves. After filtering out low-expressed genes using median expression thresholds, gene expression was analyzed with a linear model using the limma package [3] in R. Expression differences between the two species were calculated using contrast tests and corrected by eBayes. The identified differential genes were then analyzed by CFS in the WEKA software environment to select an optimal subset of genes with the highest correlation to species differences and minimal redundancy. Following CFS selection, expression data from 16 selected genes across 48 samples were used to train and validate a Random Forest classifier. The model was evaluated using 10-fold cross-validation and performance metrics including accuracy, kappa coefficient, F-measure, and confusion matrix. The Random Forest model achieved 97.91% accuracy in distinguishing the two species based on selected gene expression, with a kappa coefficient of 0.958, confirming its strong classification performance. This study provides a solid foundation for better understanding the gene regulation mechanisms and biological pathways that underlie the differences between turmeric and ginger. The findings can support breed improvement, enhance medicinal quality, and advance industrial applications of these valuable species.

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Poster Presentation ID: 1148

Ultrasound-Assisted Flavonoid Extraction from *Crataegus monogyna* L. Using Different Solvents

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ARTICLE INFO	ABSTRACT
Keywords: Medicinal Plants Flavonoid Ultrasound Solvent Effect <i>Crataegus monogyna</i>	Medicinal plants, rich in bioactive compounds, are valuable sources offering a novel approach for treating a wide range of diseases and controlling plant diseases. Hawthorn (<i>Crataegus monogyna</i> L.) contains natural compounds in its extracts that show various bioactive and health-promoting properties [1]. Flavonoid-rich extracts of <i>Crataegus</i>, containing compounds like vitexin and hyperoside, have traditionally supported heart health by reducing oxidative and inflammatory markers [2]. Effective extraction through selecting appropriate methods based on the properties of targeted bioactive compounds not only enhances the quality and yield, but also enables the synthesis of more potent and bioavailable derivatives, contributing to reduced plant use and sustainable utilization of limited medicinal plant resources. To enhance extraction efficiency, high-energy ultrasound is used, which induces cavitation and applies immense pressure from bubble collapse on the cellular structure, thereby accelerating the release and diffusion of intracellular compounds into the solvent through mechanical and thermal effects[3]. This study aimed to investigate the highest flavonoid content in hawthorn (<i>Crataegus monogyna</i>) extract using five different solvents, including water, ethanol, hexane, diethyl ether, and ethyl acetate, with solvent-to-solid ratios of 1:5, 1:10, and 1:15 w/v. The extraction was performed under optimized ultrasonic-assisted conditions at three different time intervals: 10, 30, and 50 minutes, in order to determine the most efficient extraction conditions for obtaining maximum flavonoid yield. The total flavonoid content was determined using the Aluminum Chloride Colorimetric Method. The results showed that the highest flavonoid extraction yield under ultrasonic treatment was achieved using ethanol (1:15 w/v, 50 minutes), with 157.8 mg quercetin equivalent per gram of dry weight (mg QE/g DW). In contrast, the lowest yield was obtained using water (1:5 w/v, 30 minutes) at 0.24 mg QE/g DW. Other solvents showed extraction yields ranging from 3 to 90 mg QE/g DW. These results emphasize the importance of solvent selection and the significant impact of ultrasonic treatment in enhancing extraction efficiency.

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Poster Presentation ID: 1149

Micromorphological Study of *Cuscuta* species in northern Iran

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ARTICLE INFO

Keywords:

Epiderm

Medicinal Plant

Parasite

SEM

Stomata

ABSTRACT

Cuscuta is the only parasitic genus in the family Convolvulaceae [1]. The wide geographical distribution of *Cuscuta* species, the large number and diversity of their hosts, and the problems associated with their control have placed this plant among the most harmful parasitic plants worldwide [2]; however, given the medicinal value of some species of this genus, a more complete study of this plant becomes more important. In this study, the micromorphological characteristics of the epidermis and stomata of twelve populations of three species *C. australis*, *C. campestris*, and *C. chinensis* were examined to evaluate their diagnostic value. For this purpose, plant samples were collected and identified from the northern provinces of Golestan, Mazandaran, and Gilan, and were examined using light and electron microscopy. Quantitative features including counting the number of stomata and measuring their dimensions and qualitative features including the arrangement of epidermal cells and the location of stomatal guard cells were analyzed. Considerable differences in the appearance of stomata and epidermal cells were observed among species. The stomata were large, 50-70 micrometers long, and in some species the epidermis cells surrounding them contain a red pigment. Accordingly, the micromorphological features of the epidermis and stomata are useful diagnostic tools for species identification. It was also found that the use of light and electron microscopy provides accurate information to improve taxonomic methods and help in plant identification. The observed differences and similarities are likely due to the effects of ecological conditions and genetic differences, and a better understanding of these relationships can help develop more accurate methods for classifying and identifying species in botanical studies.

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Poster Presentation ID: 1150

Effect of BAP and IBA Hormone Treatment on *In vitro* Shoot Regeneration and Proliferation of Hawthorn (*Crataegus azarolus*)

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ARTICLE INFO	ABSTRACT
Keywords: <i>Crataegus azarolus</i> <i>In vitro</i> Regeneration Hormonal Treatment	Hawthorn (<i>Crataegus Azarolus</i>), as important is a prominent shrub, belongs to, Rosaceae family, is one of the prominent species of the Zagros forests, which is distributed worldwide in Iran, Syria, Palestine, Lebanon, Iraq, Anatolia, and Turkmenistan. [1, 2]. Hawthorn fruits are edible and have medicinal properties. The flowers, leaves, and fruit of hawthorn are a rich source of antioxidants and polyphenols. Proliferation and exploitation of medicinal plants is main object of modern technologies such as biotechnology and plant tissue culture. The effects of different concentrations of BAP and IBA on <i>In vitro</i> culture regeneration of Hawthorn were studied. This experiment were performed in factorial completely randomized design with BAP in three levels (0, 4.4, 8.8 μM) and IBA in three levels (0, 1.1, 2.2 μM) and in three replications. Results of ANOVA showed that there is significant difference between treatments ($P < 0.01$). The highest average of regenerated shoots (5.8) and percentage of regeneration (100%) was obtained in 4.4 μM BAP with 1.1 μM IAA and the lowest average shoot Regeneration (0) and percentage of regeneration (0%) was observed on MS medium without hormone. The maximum number of regenerated shoots (10) and 100% regeneration was observed on 4.4 μM BAP with 1.1 μM IBA. The minimum regeneration percentage (0%) was obtained in MS medium without hormones. Rooting experiments were performed in factorial completely randomized design with IBA in two levels (1.1, 2.2 μM), and IAA in two levels (1.1, 2.2 μM), on basal MS media. The results showed that the highest percentage of rooting (86.67%) was observed on MS medium + 2.2 μM IBA hormone and MS + IAA (1/1 μM), with average 4.3 and 3.33 respectively. <i>In vitro</i> regenerated shoots were acclimatized in sterile perlite media with 100% survivals.

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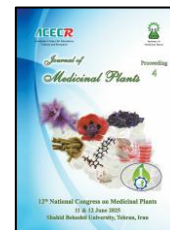
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Poster Presentation ID: 1151

Investigating the effect of growth regulators (BAP and IBA) on callus formation of yellow hawthorn (*Crataegus azarolus*) in MS culture medium.

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ARTICLE INFO

Keywords:

Crataegus azarolus
In vitro Regeneration
Hormonal Treatment

ABSTRACT

Crataegus species are shrubs or small trees. Is a genus of several hundred species of shrubs and trees in the family Rosaceae. Hawthorn is used to help protect against heart disease and help control high blood pressure and high cholesterol. callus formation and exploitation of medicinal plants is main object of modern technologies such as biotechnology and plant tissue culture. The effects of different concentrations of BAP and IBA on *In vitro* culture of Hawthorn were studied. This experiment was performed in factorial completely randomized design with BAP in Four levels (0, 1, 3, 5 mg/l) and IBA in two levels (0, 0.1 mg/l) and in three replications. Results of ANOVA showed that there is significant difference between treatments ($P < 0.01$). The highest percentage of callus formation (100%) was obtained in 5 mg/l BAP with 0.1 mg/l IBA and the lowest percentage of callus formation (0%) was observed on MS medium without hormone. In the present study, the amount of 5 mg/L of BAP, in combination with 0.1 mg/L of IBA, can be introduced as a protocol for *Crataegus azarolus* callus formation due to the production of 100% callus with the largest diameter, spherical and embryogenic type, and green in MS culture medium. Further research is needed in this field to achieve better results.

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2. Motaghi, M., Mokhtari, A., (2019). The determination of optimal condition for micro propagation of *Crataegus aronia* under in vitro culture. *Journal of Plant Research (Iranian Journal of Biology)*; 32(1): 205-217.



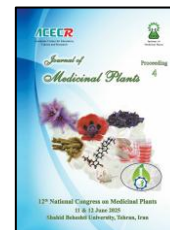
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Poster Presentation ID: 1153

***Melaleuca alternifolia* Essential Oil Inhibited Influenza A Virus Replication**

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ABSTRACT

Influenza A virus (IAV) continues to pose a significant threat to global health owing to its rapid spread and potential to cause severe respiratory illness. The rise in antiviral-resistant strains underscores the need for developing novel therapeutic agents [1]. This study investigated the antiviral efficacy of *Melaleuca alternifolia* (tea tree) essential oil against IAV replication in Madin-Darby Canine Kidney (MDCK) cells, comparing its effects with two conventional antiviral drugs; amantadine and oseltamivir. Cytotoxicity was assessed via MTT assay to determine the essential oil 50% cytotoxic concentration (CC₅₀) and non-toxic concentration (NCTC). To evaluate antiviral potential, hemagglutination (HA) assay was initially performed to evaluate the ability of essential oil to inhibit viral replication. Subsequently, the MTT assay was used to assess cellular protection in treated cultures versus untreated infected culture [2]. A time-of-addition assay revealed stage-specific effects: The essential oil completely blocked viral entry in pre-treatment condition and significantly reduced viral replication during co- and post-treatment phases. Viral infectivity dose (TCID₅₀ assay) and RNA load (RT-qPCR) were quantified following the treatments [3]. Notably, the antiviral potency of the essential oil matched oseltamivir and exceeded amantadine in reducing both viral load and cytopathic effects *in vitro*. The findings indicate that *Melaleuca alternifolia* essential oil possesses robust antiviral potential and may serve as a promising natural alternative or supplement to conventional anti-influenza therapies, particularly in the face of growing drug resistance.

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Comparative evaluation of two commercial herbal products on clinical signs and mucociliary system of broilers challenged with H9N2 avian influenza/infectious bronchitis viruses

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ARTICLE INFO

Keywords:

Viral respiratory
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Goblet cells

ABSTRACT

Mixed viral respiratory diseases pose significant challenges in poultry, leading to high mortality rates and economic losses. Due to the absence of effective antiviral treatments, herbal alternatives are commonly employed. This study focused on the effects of two commercial herbal products, Anzofin® (ENZ) and Biobron® (BIB), on broilers infected with H9N2 avian influenza and infectious bronchitis viruses. Methods: A total of 140 broilers, 25 days old, were allocated to four groups: a negative control (NC), a positive control (PC) with no treatment following viral challenge, and treatment groups receiving either Anzofin® (ANZ) or Biobron® (BIB) via drinking water for five days post-infection. Clinical signs and mortality rates were monitored, and histological evaluations of tracheal samples were conducted at specified post-challenge intervals. Findings indicated that clinical sign severity was similar across the PC and treatment groups at days 3, 6, and 9 post-challenge. The mortality rates were relatively comparable: 8.6% for PC and ANZ groups, while the BIB group recorded a higher rate (14.3%). Notably, tracheal mucus secretions in the BIB group on day 6 were significantly increased compared to PC and ANZ groups. The ciliostasis assay revealed no significant differences in ciliary function across groups, also in histological examination the goblet cell counts were similar between the ANZ and PC groups. However, the BIB group had a significantly higher number of goblet cells than both ENZ and PC groups. While Anzofin® did not significantly influence clinical outcomes, Biobron® led to higher mortality and enhanced goblet cell numbers. Further investigations into these herbal products' effectiveness in managing respiratory viral diseases in poultry under field conditions are warranted.

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Inhibitory Effects of Trans-Cinnamaldehyde and Its Nanoemulsion against *Pseudomonas aeruginosa* Biofilm

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ARTICLE INFO

Keywords:

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P. aeruginosa

ABSTRACT

Biofilms play a pivotal role in bacterial pathogenicity and antibiotic resistance, representing a major challenge in the treatment of bacterial infections. Among essential oil phytochemicals, trans-cinnamaldehyde (TC), a major component of *Cinnamomum* spp. essential oil, has been recognized for its antimicrobial and anti-biofilm activity [1]. However, its application has been limited due to its low bioavailability, high volatility and chemical reactivity. To overcome these limitations, oil-in-water nanoemulsion (NE)-based delivery system can be applied [2]. In this study, TCNE was prepared using a high energy sonication method with Tween 80, span 80 and lecithin. The mean particle size and polydispersity index of prepared nanoemulsion were 53.24 ± 1.25 nm and 0.36 ± 0.03 nm, respectively. Dynamic light scattering measurements over four weeks confirmed the long-term stability of formulation. Antibacterial activity of TC and TCNE were evaluated by determining the minimum inhibitory concentration (MIC) against *Pseudomonas aeruginosa* PAO1, which was found to be 2 mg/mL for TC and 1 mg/mL for TCNE. The biofilm inhibitory effects of TC and TCNE were evaluated using crystal violet staining assay at sub-inhibitory concentrations ($1/2$, $1/4$ and $1/8 \times$ MIC). Both TC and its NE exhibited concentration-dependent inhibitory effect, with the highest inhibition ($83.4 \pm 1.81\%$) observed for TCNE at $1/2 \times$ MIC. Scanning electron microscopy further supported the inhibitory effect of TCNE on PAO1 biofilm. These results demonstrate the potential use of TCNE as a promising strategy for combating biofilm-associated bacterial infections.

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Phytochemical Evaluation of *Coriandrum sativum* L. From Nahavand, Hamedan, Iran

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ARTICLE INFO	ABSTRACT
Keywords: <i>Coriandrum sativum</i> Essential oil Antioxidant activity Medicinal plant	<i>Coriandrum sativum</i> L., commonly known as coriander, is a medicinal plant belonging to the Apiaceae family and is cultivated in various regions worldwide. Among its different varieties, the coriander grown in Nahavand (Hamedan Province, Iran) is known for its high quality and holds significant economic, export, and clinical value. Traditionally recognized for their ethnomedicinal applications, the fruits demonstrate anti-inflammatory, stomachic, carminative, antipyretic, and stimulant activities, and are utilized in treating dyspepsia and migraine conditions (1). The fruits of <i>Coriandrum sativum</i> L. growing wild in Nahavand, Iran were subjected to hydrodistillation using a Clevenger to produce light yellow oils. The volatile constituents in the essential oil of <i>Coriandrum sativum</i> L. were investigated by GC/Mass and GC/FID. The antioxidant activity of <i>Coriandrum sativum</i> essential oil was assessed through the DPPH radical scavenging assay. Based on the obtained results, the essential oil yield from coriander fruits was 0.3% (v/w) relative to the dry weight of the sample. The qualitative and quantitative phytochemical analysis of essential oil was performed and the major components of it were linalool as the predominant constituent (57.85%), along with α-Pinene and γ-Terpinene (2). Although the essential oil of coriander fruits demonstrated free radical scavenging activity in antioxidant assay, its efficacy was significantly lower compared to the reference antioxidant compound, ascorbic acid. These findings confirm the quality of Nahavand coriander and its compliance with pharmaceutical standards. Further research and documentation are recommended to improve quality control and enhance the export value of this medicinal plant.

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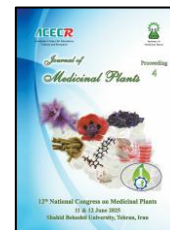
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A Compelling Comparison of Traditional and Online Herbal Shops in Selling Medicinal Plants and Herbal Distillates

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ARTICLE INFO	ABSTRACT
Keywords: Traditional Herbal Shops Online Herbal Shops Medicinal Plants Herbal Distillates Comparison	Introduction: With the rise of online shopping, traditional and online herbal shops are in fierce competition. This study compares the two models, focusing on product variety, sales volume, marketing strategies, and customer trust. Material and methods: Data was collected from 10 traditional herbal shops and 10 online stores. The results show that while online shops excel in quick access and product diversity, traditional herbal shops continue to thrive due to personal consultations and customer trust. Herbal distillates remain the top-selling product in both models. Results and Discussion: Herbal distillates are the top-selling product in both traditional and online shops. Online stores also offer a wide range of capsules, oils, and powdered herbs. Traditional shops mainly source products from local suppliers. Online shops rely on reputable brands and industrial suppliers. In traditional shops, personal consultations and close relationships with sellers play a key role in building trust. Online stores build trust through user reviews and certified products, though concerns about product authenticity still exist. Traditional herbal shops rely heavily on word-of-mouth and loyal customers. Online stores use Instagram, special discounts, and digital ads to attract new customers. Traditional shops face challenges like limited accessibility and a lack of quality control. Online stores deal with issues such as counterfeit products and delayed deliveries. While traditional herbal shops continue to hold a special place due to personal consultations and customer trust, online stores are expanding rapidly because of faster access, more variety, and convenience. Coculation: The future of the herbal market likely lies in combining both models, offering an ideal solution for the growing demand for medicinal plants and herbal distillates.

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Poster Presentation ID: 1159

Anti-Cancer Potential of Medicinal Plants in Mazandaran Province, Iran: Ethnobotanical Perspectives and Pharmacological Insights

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ARTICLE INFO	ABSTRACT
Keywords: Anti-cancer medicinal plants Mazandaran flora Phytochemicals in cancer therapy Ethnobotanical knowledge Natural product drug discovery	Mazandaran Province on Iran's northern Caspian coastline is a biodiversity hotspot with abundant flora, much of which has been used in traditional medicine for centuries. One of the many therapeutic uses, the employment of indigenous flora in cancer treatment shows great promise. This review combines ethnobotanical data and pharmacological evidence on the anti-cancer properties of medicinal plants of Mazandaran, their bioactive substances, mechanism of action, and therapeutic efficacy. Different plant species including <i>Euphorbia helioscopia</i>, <i>Scutellaria luteo-caerulea</i>, <i>Ficus carica</i>, <i>Artemisia absinthium</i>, and <i>Urtica dioica</i> have been reported to possess promising anti-tumor activity via apoptosis induction, anti-angiogenesis, and modulation of oxidative stress. These plants, which possess flavonoids, alkaloids, terpenoids, and phenolic compounds, were found to possess potent cytotoxic activity against many cancer cell lines in vitro and in vivo. However, despite the growing proof of their efficacy, the lack of standardized formulations and clinical corroboration constitutes a barrier to their widespread therapeutic application. This review highlights the need for further research, including molecular mechanistic investigations and clinical trials, to establish the safety, effectiveness, and potential for commercialization of these plant-based agents. Furthermore, the integration of ethnobotanical data with modern pharmacological research is an appealing strategy for the discovery of novel anti-cancer medications. As the global demand for natural products as cancer therapy increases, the fertile medicinal flora of Mazandaran presents a precious asset that can contribute to the development of new, sustainable, and culturally accepted cancer therapies.

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Antioxidant Activity of Medicinal Plants in Mazandaran Province, Iran: Phytochemical Profiles and Therapeutic Points of View

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ARTICLE INFO	ABSTRACT
Keywords: Antioxidant activity Medicinal plants of Mazandaran Phytochemicals and free radical scavenging Ethnopharmacology of Northern Iran Oxidative stress and herbal therapy	Mazandaran Province within the temperate and humid belt of northern Iran is home to a rich wealth of medicinal plants that are utilized in extensive use in traditional medicine. Apart from their broad range of benefits to health, antioxidant activity is one of the most significant therapeutic features of many local species. Oxidative stress resulting from a discrepancy between the body's antioxidant defense and reactive oxygen species (ROS) has been linked to aging and pathogenesis of chronic diseases such as cancer, cardiovascular diseases, and neurodegenerative disorders. This study investigates the antioxidant activity of certain medicinal plants indigenous to Mazandaran, including <i>Urtica dioica</i>, <i>Melissa officinalis</i>, <i>Hypericum perforatum</i>, <i>Punica granatum</i>, and <i>Berberis vulgaris</i>. The free radical scavenging activity of these species assessed using in vitro assays such as DPPH (2,2-diphenyl-1-picrylhydrazyl), ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid)), FRAP (ferric reducing antioxidant power), and ORAC (oxygen radical absorbance capacity). Current findings indicate that these plants possess high antioxidant activity, which parallels their high flavonoid, phenolic acid, tannin, and vitamin content. <i>U. dioica</i> contained the highest DPPH scavenging activity among them, while <i>P. granatum</i> followed it, but <i>M. officinalis</i> possessed the highest FRAP activity. The present research also investigates the phytochemical composition of the given plants and compares these with the ancient ethnopharmacological applications. The results emphasize the importance of synergy between ethnopharmacological information and scientific data to validate the use of such plants in modern phytotherapy. Additional pharmacological and clinical assessment was also urged by this study to understand the complete therapeutic value of Mazandaran indigenous plants and their use in the prevention and treatment of oxidative stress-linked illnesses.

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The Best-selling Medicinal Plants of Iranian Herbal Shops

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ARTICLE INFO	ABSTRACT
Keywords: Herbal shops Iran Medicinal plants Traditional medicine	Medicinal plants are considered valuable resources for therapeutic and nutritional purposes. To date, over 2000 medicinal and aromatic species have been reported for the flora of Iran (Amiri et al., 2021). This high diversity of medicinal plants has led to an increased demand among the locals for their health. Herbal shops, as the main distribution centers of these plants, play a crucial role in preserving traditional knowledge and providing the community with access to natural remedies (Khorasani et al., 2024). Therefore, the present study aimed to identify medicinal plants and the characteristics of suppliers in herbal shops across Iran. The research was conducted using a descriptive-survey method, along with library studies and personal experience. The status of 775 herbal shops from different regions of the country was examined. Our findings indicate that approximately 50% of sellers have a high school education, with an average age of 40 years and 15 years of work experience. Furthermore, over 40% of them learned this profession through ancestral training. In total, about 120 common medicinal plants belonging to the following families were identified: Lamiaceae (with <i>Stachys lavandulifolia</i>, <i>Mentha</i> sp. and <i>Thymus</i> sp.), Asteraceae (with <i>Achillea</i> sp., <i>Artemisia</i> sp. and <i>Cichorium</i> sp.), Apiaceae (with <i>Carum carvi</i>, <i>Cuminum cyminum</i>, and <i>Foeniculum vulgare</i>) and Fabaceae (with <i>Alhagi</i> sp., <i>Astragalus</i> sp., <i>Glycyrrhiza glabra</i>) being among the best sellers. The most common reasons for people's visits are related to allergy, digestive and joint problems. Given the significant demand from the public and the presence of young sellers, it is recommended that continuous organizational supervision be implemented for the proper supply of these medicinal plants, along with the establishment of educational courses aimed at maintaining public health.

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Diagnostic Value of Palynological Features for Improving the Taxonomic Relationships in Some Medicinal Genera of the Tribe Astereae (Asteraceae)

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ARTICLE INFO	ABSTRACT
Keywords: Astereae Asteraceae Pollen micromorphology SEM	The Astereae, with about 222 genera and 3100 species, is the second largest and one of the best known tribes of the Asteraceae family, mainly because of its medicinal plants. Although the range of the members of this tribe extends from the Arctic to the tropics, they are more numerous in temperate regions [2]. Some genera of this tribe such as <i>Conyza</i> Less., <i>Symphyotrichum</i> Nees. and <i>Grangea</i> Adans. have useful medicinal properties [1]. The taxonomy and classification of this tribe have always been controversial and problematic [3]. Therefore, pollen micromorphology can be considered as a useful tool to resolve the taxonomic problems of this tribe. In the present study, pollen grains of 36 taxa belonging to 12 genera (including <i>Aster</i> L., <i>Bellis</i> L., <i>Chamaegeron</i> Schrenk., <i>Conyza</i>, <i>Dichrocephala</i> DC., <i>Erigeron</i> L., <i>Galatella</i> Cass., <i>Lachnophyllum</i> Bunge, <i>Myriactis</i> Less., <i>Psychrogeton</i> Boiss., <i>Solidago</i> L. and <i>Symphyotrichum</i>) of the Astereae tribe in Iran were examined using scanning electron microscopy. According to clustering and ordination analyses, a remarkable diversity of pollen features was observed among the studied species. Based on these results, many species belonging to the subtribes Asterinae, Bellidinae, Conyzinae, Solidagininae and Symphiotrichinae could be well delimited from each other based on pollen features. Although taxonomic heterogeneity was also observed in the relationships among some species of the studied subtribes, this could be related to important factors such as the adaptation of species of this subtribe to harsh environmental conditions and the response of palynological features to climatic changes.

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Investigation of the Effect of *Trachyspermum copticum* L. Medicinal Plant Extract on Improving Postharvest Characteristics of *Dianthus caryophyllus* Flower

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ARTICLE INFO	ABSTRACT
Keywords: Medicinal plant <i>Trachyspermum copticum</i> L. Peroxidase Medicinal metabolites Microbial population	Medicinal plant extracts can be used in vase life solutions to enhance the quality and postharvest longevity of cut flowers. Safety, cost-effectiveness, efficacy, and availability are among the advantages of using plant-based extracts [3]. <i>Trachyspermum copticum</i> L., a member of the <i>Apiaceae</i> family, is rich in significant medicinal metabolites (such as thymol, gamma-terpinene, cymene, and others) with antimicrobial effects [2, 3]. The objective of this study was to improve the postharvest characteristics of <i>Dianthus caryophyllus</i> flowers using the medicinal extract of <i>Trachyspermum copticum</i> L. For this purpose, after preparing the plant extract, the treatments were applied at desired concentrations (0, 500, and 750 mg/L) to the target plants. Traits including stem diameter, vase life (days), relative fresh weight, solution uptake, soluble solids content, ion leakage, photosynthetic pigments, anthocyanin content, antioxidant activity, total protein, malondialdehyde content, and the activity of enzymes such as superoxide dismutase, peroxidase, and catalase, as well as microbial population, were evaluated. After screening, results indicated that the <i>Trachyspermum copticum</i> L. treatment at a concentration of 500 mg/L provided greater vase life, stem and flower diameter compared to other treatments. By preserving the activities of superoxide dismutase and peroxidase enzymes, it reduced physiological stress, leading to lower ion leakage and malondialdehyde levels, and maintained a higher anthocyanin content in the flowers. Moreover, the total phenol and flavonoid contents increased with the application of <i>Trachyspermum copticum</i> L. extract. This study also showed that the <i>Trachyspermum copticum</i> L. extract treatment at 500 mg/L reduced the microbial population compared to the control.

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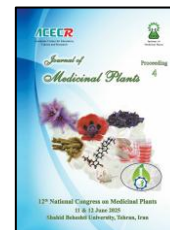
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Protective effects of *Zingiber officinale* extract against the negative impact of acrylamide by regulating P53, BCL-2, and TNF- α expression

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ARTICLE INFO	ABSTRACT
Keywords: <i>Zingiber officinale</i> Acrylamide Histochemistry Testis Rat	Acrylamide (ACA), a common food and industrial toxicant, impairs male reproductive function through oxidative stress, hormonal disruption, and apoptotic pathways. Natural antioxidants such as <i>Zingiber officinale</i> (ginger), known for their anti-inflammatory and free radical-scavenging properties, may offer protection against ACA-induced testicular toxicity. Ginger (GING), a widely used medicinal plant, exhibits potent antioxidant, anti-inflammatory, and anti-apoptotic effects primarily attributed to its bioactive compounds. This study investigated the protective effects of <i>Zingiber officinale</i> (ginger) extract (GING) on immunohistochemical changes (p53, BCL-2, and TNF-α) in the testes of rats exposed to ACA. Thirty-two male Sprague-Dawley rats were divided into four groups (n=8): Control (untreated), ACA (10 mg/kg), GING (200 mg/kg), and ACA+GING (co-treatment). Immunohistochemistry was performed to assess the expression of anti-apoptotic (BCL-2) and apoptotic (p53) proteins, as well as the pro-inflammatory cytokine TNF-α, in rat testis tissue. Tissue sections were prepared at a thickness of 3 μm and stained according to the manufacturer's instructions. After 52 days, immunohistochemistry revealed that ACA downregulated BCL-2 (anti-apoptotic) and upregulated p53 (pro-apoptotic) and TNF-α (pro-inflammatory) in testis tissue, whereas GING reversed these changes (p < 0.05). The pro-apoptotic p53 protein was absent in the testes of rats in the GING-treated groups. BCL-2 expression was observed in most areas of the histological slides, including germinal cells of the seminiferous tubules and interstitial Leydig cells in the testes of both the GING and healthy control groups. These findings suggest that ginger extract mitigates ACA-induced testicular damage by suppressing apoptotic and inflammatory pathways.

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Poster Presentation ID: 1167

Protective role of wheat sprout extract on the histomorphometric features of rat skin following acrylamide exposure

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ARTICLE INFO	ABSTRACT
Keywords: Wheat sprout Acrylamide Histomorphometry Skin Rat	Wheat sprouts are a rich source of powerful antioxidants, such as polyphenols. These antioxidants are inexpensive and readily available. Acrylamide is a common, odorless, and colorless chemical produced during food processing and is widely used in various industries and laboratories. Smokers are continuously exposed to acrylamide through cigarette smoke. This study aimed to investigate the effect of wheat sprout extract on the histomorphometric structure of rat skin after exposure to acrylamide. Twenty healthy adult rats were divided into four groups: healthy control (no treatment), wheat sprout extract (200 mg/kg), acrylamide (50 mg/kg), and wheat sprout extract + acrylamide (200 mg/kg). After 21 days, skin samples were collected from the neck area of the rats and placed in 10% formalin for histological analysis. In this study, wheat sprout extract at a dose of 200 mg/kg showed positive effects on changes in the histological structure of rat skin caused by acrylamide. There was a significant increase in the number of sebaceous glands, the thickness of the dermis layer, the percentage distribution of collagen fibers in the dermis, the number of fibrocyte and fibroblast cells in this layer, and the number of hair follicles compared to the group receiving acrylamide ($P < 0.05$). Overall, the results showed that wheat sprout extract may have positive effects on skin structure repair and offer protective effects against acrylamide, other harmful substances, and pollutants.

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Evaluating the Role of *Bacillus subtilis* in Enhancing Salt Tolerance in *Ocimum basilicum*

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ARTICLE INFO

Keywords:

Basil
Bacillus subtilis
Medicinal plants
Ocimum basilicum
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ABSTRACT

Ocimum basilicum (basil), a widely utilized aromatic medicinal plant, is highly valued in culinary, perfumery, cosmetic, and health industries due to its rich flavonoid and polyphenol content. Historically, basil has played a significant role in traditional medicine, particularly for diabetes management, with multiple studies confirming its antidiabetic effects through animal models. To investigate the role of *Bacillus subtilis* in improving basil's tolerance to salinity, a factorial experiment was conducted under greenhouse conditions using a randomized complete block design (RCBD). The experiment consisted of 14 treatments, integrating seven salinity levels (ranging from 0 to 12 dS/m) and two bacterial conditions (presence and absence of *Bacillus subtilis*), with four replications per treatment. Key physiological and biochemical parameters—including plant height, fresh and dry biomass, essential oil yield, chemical composition of essential oils, and total phenol and flavonoid content—were measured to evaluate basil's response to varying salinity conditions. Results indicate that basil's tolerance threshold to salinity significantly increases in the presence of *Bacillus subtilis*, reaching up to 8 dS/m. Quantitative assessments reveal notable improvements in biomass accumulation, essential oil production, and phenolic content under saline conditions with bacterial inoculation. These findings underscore the potential of biological approaches, such as bacterial inoculation, in promoting the sustainable cultivation of medicinal plants in Iran by mitigating salt-induced stress.

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Studying the Effect of Chitosan and Putrescine on Growth and Some Physiological Traits of the Medicinal Plant Basil (*Ocimum basilicum* L.) under Hydroponic Conditions

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ARTICLE INFO

Keywords:

Greenhouse
Polyamine
Chlorophyll
Carotenoid

ABSTRACT

The use of some medicinal plants has been traditionally practiced and has had great importance in the development of various societies (1). Basil is one of the most important medicinal plants whose essential oil is used in various pharmaceutical, food, cosmetic and health industries. For this reason, extensive research is always being conducted to find medicinal products and substances from plants (2). The present study aimed to evaluate the quantitative and qualitative performance of the medicinal plant basil in hydroponic conditions under the influence of different levels of chitosan and putrescine on morphological, physiological, percentage and essential oil yield of this plant. For this purpose, a factorial experiment was conducted in the form of a completely randomized block design with three replications. The experimental factors included chitosan at three levels of zero, 0.01 and 0.02 percent and putrescine at three levels of zero, 0.01 and 0.1 percent. Plants were sprayed as foliar spray at the full growth and flowering stages. One month after treatment, the plants were harvested and traits such as plant height, number of leaves and number of side branches, fresh and dry weight yield of shoots, volume and fresh and dry weight of roots per square meter, chlorophyll a, b, total and carotenoid, phenol, total flavonoid, antioxidant activity were measured. According to the results obtained, foliar spraying with chitosan and putrescine had positive effects on the mentioned traits. So that plant height, leaf area, number of side branches, volume and fresh weight of roots, percentage of essential oil and essential oil yield increased. And it did not have a significant effect on traits such as phenol, flavonoid and carotenoid. Finally, it should be noted that according to the results obtained, chitosan and putrescine treatment has positive effects at certain concentrations.

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Poster Presentation ID: 1171

Nanocarbon Enhances Growth in (*Salvia miltiorrhiza*) Tissue Culture: Optimal Concentration for Biomass Increase

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ARTICLE INFO	ABSTRACT
Keywords: Weight Shoots Roots Nanocarbon <i>Salvia miltiorrhiza</i>	<i>Salvia miltiorrhiza</i> (<i>Salvia miltiorrhiza</i>) from the Lamiaceae family is an important medicinal plant with bioactive compounds such as tanshinones and phenolic compounds that have anticancer and cardiovascular protective properties. In this study, the effect of different concentrations of nanocarbon (0, 100, 250 and 500 mg/L) on the fresh and dry weight of shoots and roots of tissue cultured plants was investigated. The results showed that nanocarbon treatment had a significant effect on plant growth, such that the concentration of 500 mg/L caused the greatest increase in root biomass (fresh weight 14.4%, dry weight 23.53%) and shoots (fresh weight 20.66%, dry weight 21.43%). Observations showed that high concentrations of nanocarbon (especially 500 mg/L) caused a significant increase in the fresh and dry weight of shoots and roots. This is probably due to the improvement of nutrient uptake and stimulation of photosynthetic compound synthesis. However, lower concentrations (100 mg/L) had a negative effect, which may be due to the toxicity of nanoparticles at certain concentrations. This study demonstrates the potential of nanocarbon as a growth enhancer in red sage tissue culture and suggests that nanocarbon treatment at a concentration of 500 mg/L can be used as an effective method to increase red sage biomass in tissue culture. To optimize the results, further studies on the mechanisms of nanocarbon effects on plant secondary metabolism are suggested.

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Poster Presentation ID: 1173

Investigation of Genetic Diversity of *Acanthophyllum glandulosum* Base on Phenolic Content and Antioxidant Activity

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ARTICLE INFO

Keywords

Medicinal plant
Acanthophyllum
Ecotypes
Antioxidant
Total phenolic

ABSTRACT

Medicinal plants are rich in diverse specialized metabolites that have demonstrated at various therapeutic properties including anti-inflammatory and antioxidant activities. *Acanthophyllum glandulosum* Bung., belongs to the Caryophyllaceae family, which is considered as an important rangeland medicinal plant of Iran. The antioxidant properties of this plant are linked to its high content of polyphenolic compounds, which is a critical factor in preventing cellular damage caused by oxidative stress. Evaluation of genetic diversity among different ecotypes of *Acanthophyllum glandulosum* is prerequisite for planning effective breeding programs of this species to identify superior ecotypes and introduce them for further medicinal and industrial aims. Thus, the aim of this study was to evaluate genetic variability based on total phenolics content (TPC) and antioxidant activity (through DPPH assay) on 22 different ecotypes of *Acanthophyllum glandulosum* which were collected from different geographical regions of Iran. The TPC and antioxidant activity were determined by UV/VIS spectrophotometer. Analysis of variance showed significant differences ($P < 0.05$) among ecotypes for these traits. The TPC ranges from 10.06 mg GAE g⁻¹ DW (from Borujen, Chaharmahal and Bakhtiari province) to 26.32 mg GAE g⁻¹ DW (from Dehbar Road, Razavi Khorasan Province). The antioxidant activity through DPPH method varied from 80.05% (from Borujen, Chaharmahal and Bakhtiari province) to 92.71% (from Sepidan, Fars Province). The mean content for TPC and antioxidant activity were considered as 16.31 mg GAE g⁻¹ DW and 88.83%, respectively. A high positive and significant correlation was noted between TPC and DPPH% (0.58**) which indicates that antioxidant activity of this species is closely related to the contents of total phenolics. The phenolics is a major group of natural antioxidants in leaves of *Acanthophyllum glandulosum* that play a decisive role in the antioxidant activity. The findings of this study could be beneficial for *Acanthophyllum glandulosum* breeding to select superior ecotypes in view point of antioxidant activity and TPC. This preliminary study suggest that this *Acanthophyllum glandulosum* could be used adversely as a promising source for food and nutraceutical industries due to its considerable antioxidant potentials together with its rich phenolic content.

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Poster Presentation ID: 1174

The Effects of Bioavailability-Enhanced Curcuminoids on Serum Antioxidant Status in Patients with Metabolic Syndrome

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ARTICLE INFO	ABSTRACT
Keywords: Metabolic Syndrome Curcumin Catalase Malondialdehyde Superoxide dismutase	Metabolic syndrome (MetS) is characterized by a combination of metabolic risk factors, including central obesity, impaired glucose metabolism, dyslipidemia, and hypertension (1). Emerging evidence suggests that oxidative stress and inflammation play significant roles in this condition. Curcuminoids, which are natural polyphenols, possess strong antioxidant and anti-inflammatory properties, and numerous studies have reported their antioxidant effects (2). This study aimed to investigate the impact of a phospholipid complex of curcumin on serum oxidant-antioxidant status. The research was designed as a double-blind randomized control study involving 80 patients diagnosed with metabolic syndrome. These patients were randomly divided into two groups: the case group (n=36), which received capsules of phospholipidated curcumin (1 g/day) for six weeks, and the control group (n=36), which received a placebo. Fasting blood samples were collected from each participant at the beginning and end of the study. The activity of the enzymes catalase and superoxide dismutase (SOD), as well as the levels of malondialdehyde (MDA), a marker of lipid peroxidation, were evaluated in the blood samples. Results indicated that there were no significant changes ($p > 0.05$) in the activities of catalase and superoxide dismutase before and after the intervention in both the curcumin-treated group and the control group. Additionally, serum levels of MDA did not differ significantly ($p > 0.05$) between the two groups. Therefore, the phospholipid-fortified curcumin did not demonstrate a significant effect on the oxidative stress status of the participants in this study.

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Poster Presentation ID: 1175

The Effect of Slow-Release Phosphorus Fertilizer on some Phytochemical Characteristics of Basil (*Ocimum basilicum* L.) in a Calcareous Soil

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ARTICLE INFO	ABSTRACT
Keywords: Calcareous soil Phytochemical compounds Basil (<i>Ocimum basilicum</i> L.) Slow-release phosphorus fertilizer	Phosphorus (P) is an essential nutrient for plant development and growth. Its deficiency in farmlands is obviated by the phosphate-fertilizer application. In calcareous soils, availability of P to plants is very low because of its precipitation as di- and tri-calcium-phosphates with calcite (Grotz and Guerinot, 2002). Slow-release-P fertilizers can provide P slowly for longer time as compare to very high soluble mineral-P fertilizers (Valle et al., 2022). Basil (<i>Ocimum basilicum</i> L.) is an aromatic culinary herb that has shown a great potential in therapeutic world. In this study, in order to determine the effect of organic matter /struvite composites as slow-release P-fertilizers on some phytochemical properties of the Basil (<i>Ocimum basilicum</i> L.) in a calcareous soil, a pot experiment was done with three P-fertilizer treatments, i.e., mono-potassium-phosphate, two types of organic matter/struvite composites (OM₂₅/St and OM₇₅/St), and check (no fertilizer) with three-replication. Organic matter/struvite components with high amounts of organic matter i.e., OM₇₅/St is the best treatment for improving and phytochemical properties (total phenols, total flavonoid content, and antioxidant capacity) of basil in calcareous soil (L₇₅/St > L₅₀/St > mono-potassium-phosphate). Therefore, these results suggest that the application of combined fertilizer of P and organic matter as a slow-release-P fertilizer could contribute to enhance of antioxidant activity and phytochemical compounds in basil (<i>Ocimum basilicum</i> L.) in calcareous soils.

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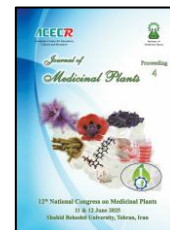
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Poster Presentation ID: 1176

Physiological and phytochemical responses of *Andrographis paniculata* to chitin and nitric oxide under nickel stress conditions

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ARTICLE INFO

Keywords:

Andrographis paniculata

Chitin

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Nitric oxide

Physiological

Phytochemical

ABSTRACT

Andrographis paniculata is a significant medicinal plant from the Acanthaceae family. The extract of this plant is abundant in active compounds, primarily consisting of diterpenes, flavonoids, and stigmasterols [1]. This research investigated the potential of chitin and nitric oxide (NO) to enhance the physiological and phytochemical responses of *Andrographis paniculata* when subjected to nickel (Ni) stress conditions. Nickel pollution presents considerable challenges to plant vitality and productivity, negatively impacting growth and the production of secondary metabolites [2]. The research aimed to evaluate the effects of different concentrations of chitin (0, 15, and 30 μ M) and NO (0, 0.5, and 1 g/L) on various growth metrics, including photosynthetic efficiency, antioxidant enzyme activity, and phytochemical compounds in *A. paniculata* under varying levels of Ni stress (0, 0.4, and 0.8 g/L). The results indicated that both chitin and NO effectively alleviated the harmful impacts of Ni, fostering growth and improving photosynthetic efficiency. An increase in antioxidant enzyme activity was noted, indicating an adaptive mechanism to oxidative stress caused by nickel toxicity. Furthermore, the combination of chitin and nitric oxide led to increased concentrations of crucial phytochemicals, including flavonoids, diterpenoids, and andrographolide (AG), which are essential for the therapeutic effectiveness of *A. paniculata*. This study highlights the potential of chitin and nitric oxide as effective biostimulants that can bolster plant resilience and enhance phytochemical production in nickel stress.

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Poster Presentation ID: 1177

Preparation of quince seed hydrogel containing MXene nanosheets and in vivo evaluation of its wound healing effect in mice

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ARTICLE INFO

Keywords:

Burn wounds
Quince Seed Mucilage
MXene
Scar
Mice

ABSTRACT

Burn wounds are one of the most common skin injuries and often have prolonged healing processes, which may lead to scars or secondary infections. Two-dimensional MXene nanosheets have unique properties that can accelerate healing and reduce scar formation. Quince Seed Mucilage (QSM), a natural biopolymer, can act as a scaffold to extend the effects of MXene. In this study, mucilage was extracted from quince seeds using water and ultrasound waves under optimized pH and temperature conditions. MXene nanosheets were synthesized from the Ti₃AlC₂ precursor (MAX phase) using a LiF and HCl solution at the desired concentration. The synthesized MXene powder was added to the mucilage. It was stirred under controlled conditions to obtain a homogenous formulation at 1, 2, and 5% concentrations. To establish a burn wound model in mice, the dorsal hair was shaved, and an 8 mm diameter brass rod preheated in 100°C water for 15 minutes was applied to the skin for 10 seconds. The prepared animals were divided into six groups: negative control (no treatment), hydrogel, MXene 1%, MXene 2%, MXene 5%, and positive control (a non-adherent silver-containing barrier dressing). Treatments were topically applied daily for 2 weeks. Photographic analysis of wounds on days 1, 3, 7, 10, and 14 showed that the QSM–MXene hydrogel-treated groups demonstrated faster wound contraction and less scar formation compared to the control groups. In the untreated group, the wound diameter was reduced by day 14. Meanwhile, the MXene-treated groups showed significantly enhanced healing. This study highlights the therapeutic potential of a QSM–MXene nanosheet composite hydrogel as a wound-healing agent. The formulation accelerated burn wound healing and minimized residual scarring, suggesting its promise as a novel bioactive wound treatment platform.

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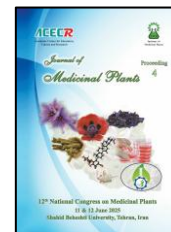
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Poster Presentation ID: 1178

Physiological and phytochemical responses of *Andrographis paniculata* to melatonin and salicylic acid under cadmium stress conditions

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ABSTRACT

Andrographis paniculata is an important medicinal herb from the Acanthaceae family, known for its rich array of therapeutically beneficial active compounds [1]. This research investigates the effects of melatonin and salicylic acid (SA) on enhancing the physiological and phytochemical characteristics of *Andrographis paniculata* when exposed to cadmium (Cd) stress. Cadmium contamination poses significant challenges to plant health and productivity, negatively affecting growth and the synthesis of secondary metabolites [2]. To explore this, a factorial experiment was conducted with three variables to assess the impact of melatonin (0, 1.2, and 2.4 mg/L) and SA concentrations (0, 0.07, and 0.14 mg/L) on various aspects of plant growth, physiological responses, and phytochemical profiles in *A. paniculata* under different levels of Cd stress (0, 0.46, and 0.92 mg/L). The findings indicate that melatonin and salicylic acid (SA) successfully mitigate the adverse effects of cadmium, promoting growth and enhancing photosynthetic efficiency and biochemical constituents. An increase in antioxidant enzyme activity was observed, suggesting a protective response against oxidative stress induced by cadmium exposure. Furthermore, the application of melatonin and SA led to higher concentrations of crucial phytochemicals, such as flavonoids, diterpenoids, neoandrographolide (NAG), and andrographolide (AG), which are vital for the medicinal properties of *A. paniculata*. This study highlights the potential of melatonin and SA as effective biostimulants to bolster plant resilience and enhance antioxidant enzyme activity and phytochemical production in the presence of cadmium stress.

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Evaluating the Role of *Bacillus subtilis* in Alleviating Salt Stress in *Portulaca oleracea*

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ABSTRACT

Purslane, scientifically known as *Portulaca Oleracea*, grows in various regions of the world. Various factors have led to purslane being mentioned in many articles as the superfood of the future. Purslane has been described as a future Power Food due to its high nutritional and antioxidant properties. Purslane has been introduced by the World Health Organization as one of the most widely used medicinal plants and has been given the title Global Panacea, meaning an elixir or all-round medicine. To evaluate the impact of *Bacillus subtilis* bacteria on Purslane, an experiment was conducted under greenhouse (Randomized Block Design) conditions involving 14 treatments (seven salinity levels) and 4 replications (different doses of salinity with bacteria applied individually and in combination). Findings revealed that Purslane tolerance to salinity improves significantly in the presence of this bacterium, reaching up to 14 dS. Based on these findings, such biological products demonstrate great potential for promoting the sustainable cultivation of medicinal plants in Iran.

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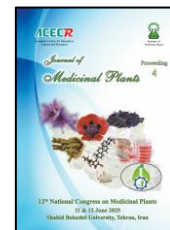
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Evaluating the Role of *Bacillus subtilis* in Alleviating Salt Stress in *Lallemantia iberica*

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ARTICLE INFO	ABSTRACT
Keywords: Basil <i>Bacillus subtilis</i> <i>Lallemantia iberica</i> Medicinal plants Salt Stress	<i>Lallemantia iberica</i>, commonly known as dragon's head, is a medicinal plant belonging to the Lamiaceae family, widely distributed across various regions of Iran. Traditionally cultivated for its seeds in southwestern Asia and southeastern Europe, its native range includes the Middle East and the Caucasus, later expanding across Europe and Eastern countries. The seeds of <i>L. iberica</i> are particularly valued for their high mucilage content, which has significant pharmaceutical and industrial applications. Given the increasing soil salinity challenges in many cultivation regions, enhancing the plant's tolerance to salinity through biological amendments offers promising solutions. To evaluate the impact of <i>Bacillus subtilis</i> on dragon's head under saline conditions, a factorial experiment was conducted under greenhouse conditions using a randomized complete block design (RCBD). The study consisted of 14 treatments, integrating seven salinity levels (0, 2, 4, 6, 8, 10, and 12 dS/m) and two bacterial conditions (presence and absence of <i>Bacillus subtilis</i>), with four replications per treatment. The bacterial inoculation was applied via irrigation water to potted plants. Key physiological and biochemical parameters—including plant height, fresh and dry biomass, seed yield, mucilage content, and ionic balance (Na⁺ and K⁺ uptake)—were measured to assess plant response to varying salinity conditions. Findings indicate that <i>Bacillus subtilis</i> significantly improves the salinity tolerance of <i>L. iberica</i>, enabling it to maintain optimal growth up to 10 dS/m. Quantitative analysis revealed enhancements in biomass production, seed yield, and mucilage content under saline conditions with bacterial inoculation. Additionally, ion balance assessments demonstrated reduced sodium accumulation and improved potassium uptake in inoculated plants, contributing to overall stress alleviation. These results highlight the potential of biological inoculants in mitigating salt-induced stress and promoting the sustainable cultivation of medicinal plants in Iran.

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Evaluating the Role of *Bacillus subtilis* in Alleviating Salt Stress in *Linum usitatissimum*

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ARTICLE INFO	ABSTRACT
Keywords: <i>Bacillus subtilis</i> <i>Linum usitatissimum</i> Medicinal plants Salt Stress	Flax (<i>Linum usitatissimum</i>), cultivated for millennia, remains one of the most versatile crops due to its seed-derived oil and fiber-based linen fabric. The seeds, known for their high nutritional value, possess significant medicinal properties, making flax an important plant in both agricultural and pharmaceutical industries. As an annual plant, flax grows up to 90 cm tall and produces striking blue flowers. Although flax is mainly grown commercially, it can also be successfully cultivated in smaller home gardens. To evaluate the impact of <i>Bacillus subtilis</i> on flax's tolerance to salinity, a factorial experiment was conducted under greenhouse conditions using a randomized complete block design (RCBD). The study included 14 treatments, integrating seven salinity levels (0, 2, 4, 6, 8, 10, and 12 dS/m) and two bacterial conditions (presence and absence of <i>Bacillus subtilis</i>), with four replications per treatment. Key physiological and biochemical parameters—including plant height, fresh and dry biomass, seed yield, oil percentage in seeds, and fatty acid composition—were measured to assess flax's response under varying salinity conditions. Results indicate that flax's tolerance to salinity significantly improves in the presence of <i>Bacillus subtilis</i>, reaching an optimal threshold of 10 dS/m. Quantitative assessments reveal that bacterial inoculation positively influences biomass accumulation, seed yield, and oil content under saline conditions. Notably, variations in fatty acid composition suggest that <i>Bacillus subtilis</i> enhances the quality and stability of flaxseed oil. These findings emphasize the potential of biological inoculants in mitigating salt stress, offering a sustainable approach for the cultivation of medicinal and industrial plants in Iran.

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Poster Presentation ID: 1182

Effect of melatonin and nitric oxide on biochemical and phytochemical responses of *Datura innoxia* under in vitro conditions

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ABSTRACT

Datura innoxia is an annual species belonging to the Solanaceae family, renowned for its striking flowers as well as its medicinal and toxic properties. This plant is indigenous to tropical regions of America and Asia, yet it has spread to various locations worldwide, including Iran [1]. *D. innoxia* is known to contain tropane alkaloids, with hyoscyamine, atropine, and scopolamine being the most significant. The active constituents of this plant exhibit anticholinergic effects on parasympathetic nerves, along with antispasmodic and potent antimuscarinic properties [1]. This research investigates the effects of melatonin and nitric oxide (NO) on enhancing the biochemical and phytochemical responses of *Datura innoxia*. The objective was to assess the impact of varying concentrations of melatonin (0, 0.25, and 0.50 μ M) and nitric oxide (0, 25, 50, and 100 μ M) on the biochemical and phytochemical traits of *Datura innoxia* in vitro. Findings revealed that 0.25 μ M of melatonin and 100 μ M of nitric oxide significantly enhanced the levels of phenols, flavonoids, anthocyanins, and antioxidant activities, while both melatonin and nitric oxide led to a reduction in protein content. An increase in the activity of antioxidant enzymes was observed, suggesting that melatonin and nitric oxide are promising biostimulants capable of improving antioxidant enzyme activities. Furthermore, the application of melatonin and nitric oxide resulted in higher concentrations of essential phytochemicals, including flavonoids and diterpenoids, which are crucial for the medicinal properties of *D. innoxia*. This study underscores the potential of *Datura innoxia* as a promising biostimulant capable of augmenting biochemical and phytochemical production in this species.

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Evaluating the Role of *Bacillus subtilis* in Alleviating Salt Stress in *Hyssopus officinalis*

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ABSTRACT

Hyssop (*Hyssopus officinalis*), a perennial herb belonging to the Lamiaceae family, is extensively cultivated for its essential oil, which enhances aromatic and sensory attributes in food, cosmetics, and pharmaceuticals, particularly for respiratory treatments. Given the increasing salinity constraints affecting agricultural regions, strategies aimed at enhancing hyssop's tolerance to saline conditions through biological interventions are crucial for sustainable cultivation. To assess the role of *Bacillus subtilis* in improving hyssop's resilience to salinity, a factorial experiment was conducted under greenhouse conditions using a randomized complete block design (RCBD). The study encompassed 14 treatments, integrating seven salinity levels (0, 2, 4, 6, 8, 10, and 14 dS/m) and two bacterial inoculation conditions (presence and absence of *Bacillus subtilis*), with four replications per treatment. Bacterial inoculation was administered via irrigation water to potted plants. Key physiological and biochemical parameters—including plant height, leaf count, fresh and dry biomass, chlorophyll content, photosynthetic efficiency, transpiration rate, and ion homeostasis (Na⁺ and K⁺ uptake)—were systematically evaluated to characterize plant responses under varying salinity conditions. The results demonstrated that *Bacillus subtilis* significantly enhances hyssop's tolerance to salinity, enabling optimal growth maintenance up to 14 dS/m. Quantitative analyses revealed marked improvements in biomass accumulation, leaf expansion, chlorophyll retention, and photosynthetic efficiency in inoculated plants compared to non-inoculated counterparts. Furthermore, bacterial inoculation facilitated ion equilibrium by mitigating sodium toxicity while enhancing potassium uptake. These findings underscore the potential of biological inoculants in alleviating salt-induced stress, thereby advancing sustainable medicinal plant cultivation in Iran.

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Traditional Knowledge of the "Mummia" in the Kabir Kuh Region (Darreh Shahr County, Ilam Province)

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ABSTRACT

Traditional knowledge is a part of the culture of local people in a specific geographical realm, developed over many years to adapt to the unique environmental conditions of their ecosystem. Understanding traditional knowledge and its connection to modern science plays an important role in the discovery of medicinal compounds and sustainable development (Sadeghi et al., 2023). The present research aims to document the traditional knowledge of the inhabitants of Darreh Shahr County (Ilam Province) regarding the identification and therapeutic uses of the "Mummia" (Mummy, Mimanika/Momaniya). For this purpose, data were collected through descriptive-survey methods by interviewing local people, herbalists, and conducting library-based studies. Our results reveal that "Mummia" is a dark-colored natural substance (brown-black) of mineral and plant origin, which oozes in a fluid form from the rock cracks of the Kabir Kuh Mountains (a protected forest-mountain region in Darreh Shahr County) during the warm summer season. Over the past years, the local and elderly people have primarily used it orally, combined with warm water, milk, and local oil, to treat wounds, joint pain, and fractures. Previous studies reported that this natural substance contains compounds such as Dibenzo-alpha pyrenes, Humic acids, Fulvic acids, as well as elements like Ca, Fe, Cu, Zn, Mg, Mn, Mo, and P (Rahmani Baroji, 2020; Alijani & Sharafi, 2021), which support its therapeutic effects. Our findings, with an emphasis on preserving part of the region's cultural heritage, could pave the way for further laboratory studies and the discovery of new natural medicines.

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Analysis of antioxidative systems and anticancer phytochemicals of *Andrographis paniculata* under different nutrient solution durations

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Andrographis paniculata

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ABSTRACT

Andrographis paniculata is an important medicinal herb from the Acanthaceae family. The extract of this plant is abundant in active compounds, primarily consisting of diterpenes, flavonoids, and stigmaterols [1, 2]. The duration of nutrient solution application plays a vital role in essential growth processes, including photosynthesis, enzyme activity, and the synthesis of secondary metabolites in plants. This study aimed to explore the effects of nutrient solution (NS) application on the antioxidant properties and immunomodulatory compounds in the medicinal herb *A. paniculata* (AP). To achieve this, an experiment was designed using a randomized complete block design (RCBD) with four durations of nutrient solution application (every day, every three days, every five days, and weekly) and five repetitions. After one month of treatment, the results revealed that the maximum shoot dry weight (6.12 g) was recorded with the three-day nutrient solution application. Furthermore, the analysis showed that the lowest ($40.67 \pm 1.84 \mu\text{g. g}^{-1} \text{FW}$) and highest ($52.80 \pm 2.71 \mu\text{g. g}^{-1} \text{FW}$) chlorophyll content occurred after one and three days of nutrient solution application, respectively. The analysis of biochemical and immunomodulatory compounds indicated that the highest concentrations of FRAP ($96.03 \pm 0.63\%$), total phenols ($0.029 \pm 0.008 \text{ mg/g}$), flavonoids ($1982.67 \pm 13.71 \text{ mg/g}$), andrographolide ($0.058 \pm 0.004 \text{ mg. g}^{-1} \text{DW}$), and neoandrographolide ($6.43 \pm 0.62 \text{ mg. g}^{-1} \text{DW}$) were obtained after three days of nutrient solution application. Consequently, the findings suggest that administering the nutrient solution every three days in a nutrient-poor sandy substrate effectively enhances the antioxidant and immunomodulatory characteristics of the *A. paniculata* plant.

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Evaluating the Role of *Bacillus subtilis* in Alleviating Salt Stress in *Echium amoenum*

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ARTICLE INFO	ABSTRACT
Keywords: <i>Bacillus subtilis</i> <i>Echium amoenum</i> Iranian Borage Medicinal plants Salt Stress	Borage (<i>Echium amoenum</i>), an annual plant of the Boraginaceae family, possesses significant medicinal, industrial, and fodder properties. Several studies have suggested that this plant exhibits resistance to salinity and has a high capacity for salt absorption. Given its adaptability to various environmental conditions across Iran and the challenges posed by soil salinity in many regions, improving its tolerance to salinity through biological interventions could enhance its cultivation potential. To investigate the impact of <i>Bacillus subtilis</i> on the salinity tolerance of Iranian Borage, a factorial experiment was conducted under greenhouse conditions using a randomized complete block design (RCBD). The study consisted of 14 treatments, integrating seven salinity levels (0, 2, 4, 6, 8, 10, and 12 dS/m) and two bacterial conditions (presence and absence of <i>Bacillus subtilis</i>), with four replications per treatment. The bacterial inoculation was applied via irrigation water to potted plants. Key physiological and biochemical parameters—including biomass accumulation (fresh and dry weight), plant height, leaf area, chlorophyll content, ion uptake (Na⁺ and K⁺). Results demonstrated that the presence of <i>Bacillus subtilis</i> significantly enhances borage's tolerance to salinity, enabling it to sustain growth at salinity levels up to 10 dS/m. Quantitative analyses revealed improvements in biomass production, leaf expansion, chlorophyll retention, and ion balance in inoculated plants compared to non-inoculated controls. These findings highlight the potential of biological amendments, such as bacterial inoculation, in mitigating salt-induced stress and promoting the sustainable cultivation of medicinal plants in Iran.

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Investigation of Hormonal Combinations and Different Light Conditions on Callus Formation in *Calendula officinalis* L.

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ARTICLE INFO	ABSTRACT
Keywords: <i>Calendula officinalis</i> L. Medicinal plant Hormonal Combination Plant tissue culture Calogenesis	<i>Calendula officinalis</i> L., commonly known as pot marigold, is considered a valuable source for the development of new pharmaceuticals due to its diverse phytochemical compounds [1]. In traditional medicine, this plant has been used to treat various ailments such as superficial burns, gastrointestinal ulcers, skin disorders, vision weakness, menstrual irregularities, varicose veins, hemorrhoids, and gastric ulcers. Biotechnological methods such as tissue culture play a vital role in the selection, propagation, and preservation of genotypes of medicinal plants in the modern era. In vitro regeneration significantly enhances the production of high-quality herbal medicines [2]. The aim of this study was to examine the effects of different hormonal combinations and light conditions on callus formation in <i>Calendula officinalis</i>. The experiment was conducted in a factorial arrangement using a completely randomized design with three replications on leaf explants. The first factor was the hormonal combination with five levels: control, 2 mg/L NAA + 1.5 mg/L BAP, 2 mg/L BAP + 1 mg/L 2,4-D, 0.8 mg/L TDZ + 0.1 mg/L NAA, and 1.5 mg/L BAP + 0.5 mg/L NAA. The second factor involved light condition with two levels: light and darkness. After approximately three weeks of culturing the leaf explants on MS medium, traits including callus induction percentage, time to callus initiation, fresh weight, dry weight, and callus volume were measured. The results indicated that the treatment with 2 mg/L NAA + 1.5 mg/L BAP under light condition showed the highest callus induction rate (100%), the shortest time to callus initiation (10 days), the greatest fresh weight (2.699 g), dry weight (1.102 g), and callus volume (1.549 mm³). The balanced ratio of these two hormones in this treatment likely activated regulatory pathways related to undifferentiated growth, maximizing callus formation.

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Effect of Dietary Inclusion of Atorvastatin and Thyme (*Zataria multiflora* Boiss) on Growth Performance in Broiler Chickens

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ARTICLE INFO	ABSTRACT
Keywords: Herbal plants Broilers Growth performance Statins	The use of medicinal plants in the poultry industry has gained traction as a natural alternative to antibiotics and synthetic growth promoters, primarily due to their numerous health benefits and positive effects on growth performance. Medicinal plants such as thyme, into poultry diets has been shown to improve feed conversion ratios and body weight gain (1). Statins are a class of lipid-lowering medications that has been linked to significant increases in body weight and muscle development in broilers, particularly in breast and drumstick weights (2). In the present study, The health benefits of thyme assessed in comparison with atorvastatin. For this aime, a total of 360 one-day-old chickens (Ross strain 308) were randomly distributed in three experimental treatmens. Dietary treatments included a control diet, a control diet with 20 mg/kg of Atorvastatin and 7.5 g/kg of thyme powder. The experimental period lasted for 42 days under a standard condition set out by the strain guidelines. The results showed that weight gain, feed conversion ratio (FCR) were improved by in-feed atorvastatin, and thyme when compared to the control ($P < 0.05$). In conclusion, feed supplementation with atorvastatin, or thyme improved growth performance in broiler chicks.

Table 1. Effects of atorvastatin and thyme on broiler growth performance

	Dietary treatments			SEM	p-value
	Contr ol	Atorvastatin (20mg/kg)	Thyme (7.5g/kg)		
Feed intake (g/bird) during: 1-42 d	4497 ^a	4289 ^c	4383.8 ^b	28.39	0.0019
Weight gain (g/bird) during: 1-42 d	2419 ^b	2567 ^a	2609 ^a	23.33	0.0007
Feed conversion ratio during: 1-42 d	1.85 ^a	1.67 ^b	1.68 ^b	0.015	0.0001

^{a,b}Means in the same raw with different letters are significantly different.

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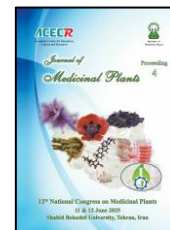
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Poster Presentation ID: 1194

Effect of Dietary Inclusion of Atorvastatin and Thyme (*Zataria multiflora* Boiss) on Gut Morphology in Broiler Chickens

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ARTICLE INFO

Keywords:
Thyme
Broilers
Performance
Gut morphology

ABSTRACT

Thyme has been shown to improve gut morphology in broiler chickens (1). The administration of atorvastatin has been observed to positively influence intestinal morphology (2). Enhanced gut morphology facilitates better nutrient absorption and overall digestive efficiency. In the present study, A total of 400 one-day-old chicks (Ross 308) were randomly distributed into three dietary treatments (**Table 1**). The results showed that duodenal, jejunal, and ileal dimensions of villi (height, width, and the surface absorptive area) were improved by in-feed atorvastatin, and thyme when compared to the control ($P < 0.05$). An improvement in gut function could be associated with the antioxidant effects of dietary supplements, which may have delayed apoptosis and resulted in increased absorption of available nutrients.

Table 1. Effects of atorvastatin and thyme on broiler gut morphometry

Item(mm)	Dietary treatments				<i>p</i> -value
	Control(0)	Atorvastatin (20mg/kg)	Thyme (7.5 g/kg)	SEM	
Duodenum					
Villus height	1.10 ^c	1.34 ^b	1.56 ^a	0.032	0.0001
Villus width	0.66 ^b	0.90 ^a	0.90 ^a	0.049	0.0017
crypt depth	0.66 ^a	0.58 ^b	0.59 ^b	0.013	0.0002
Surface area (mm ²)	2.36 ^b	3.85 ^a	4.52 ^a	0.247	0.0001
Jejunum					
Villus height	0.80 ^b	1.18 ^a	1.24 ^a	0.026	0.0001
Villus width	0.60 ^b	0.82 ^a	0.88 ^a	0.033	0.0001
crypt depth	0.67 ^a	0.51 ^b	0.50 ^b	0.018	0.0001
Surface area (mm ²)	1.53 ^b	3.06 ^a	3.46 ^a	0.159	0.0001
Ileum					
Villus height	0.80 ^b	0.94 ^a	0.97 ^a	0.034	0.0031
Villus width	0.65 ^b	0.85 ^a	0.88 ^a	0.034	0.0001
crypt depth	0.65 ^a	0.57 ^{ab}	0.54 ^b	0.029	0.0390
Surface area (mm ²)	1.68 ^b	2.54 ^a	2.70 ^a	0.141	0.0001

^{a,b} Means in the same row with different letter superscripts are significantly different.

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Poster Presentation ID: 1195

Effect of Mycorrhizal Fungi on the Expression of PAL and CHS Genes and Enhancement of Phenolic Compounds in Fennel (*Foeniculum vulgare*)

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ARTICLE INFO	ABSTRACT
Keywords: Mycorrhizal fungi Fennel Phenolic compounds PAL gene expression CHS gene expression	Fennel (<i>Foeniculum vulgare</i> Mill.), a valuable medicinal plant from the Apiaceae family, is widely used in pharmaceutical, food, and cosmetic industries due to its aromatic and medicinal compounds such as essential oils. This study aimed to enhance the essential oil content and the expression of key genes in phenylpropanoid and flavonoid biosynthesis pathways, including Phenylalanine Ammonia Lyase (PAL) and Chalcone Synthase (CHS), via symbiosis with arbuscular mycorrhizal fungi (AMF). A greenhouse pot experiment was conducted using a completely randomized design with three replications. Fungal strains including <i>Glomus musae</i>, <i>Glomus intraradices</i>, and <i>Glomus ethanaticum</i> were inoculated with fennel seeds and the designated soil. Leaf samples were collected at the five-leaf stage, pre-flowering, and post-flowering stages for total RNA extraction using the SinaClon RNA extraction kit. RNA quality and quantity were assessed by NanoDrop, with an A260/A280 ratio around 2.0, indicating good purity. One microgram of total RNA was used for cDNA synthesis, which was confirmed through PCR amplification of a reference gene. To evaluate the effect of AMF inoculation on phenolic compounds, HPLC analysis was performed on methanolic seed extracts. Results showed a significant increase in compounds such as chlorogenic acid, caffeic acid, vanillic acid, syringic acid, p-coumaric acid, ferulic acid, rosmarinic acid, luteolin, and apigenin due to AMF treatment. However, gallic acid content remained unaffected. According to the obtained results, the expression of PAL and CHS genes significantly increased in fennel plants following inoculation with mycorrhizal fungi, particularly at the pre-seed formation and five-leaf stages, respectively.

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Poster Presentation ID: 1196

Evaluation of Serum Lipids and Abdominal Fat Levels in Broiler Chickens Treated with Atorvastatin and Thyme (*Zataria multiflora* Boiss)

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ARTICLE INFO	ABSTRACT																																										
Keywords: Antihyperlipidemia Broilers Medicinal plants Lipogenesis	Extensive lipogenesis and accumulation of fat in the abdominal cavity of modern broiler chickens are neither physiologically required nor favorable for producers and consumers (1). Phytobiotics confer a wide spectrum of health benefits, including antioxidant, antihyperlipidemic, and improving poultry products quality (2). In the present study, a comparison of the effect of the chemical drug Atorvastatin (Lipitor) and the medicinal plant thyme was examined to moderate the amount of serum lipids and reduce abdominal fat of broilers. A total of 360 one-day-old chickens (Ross strain 308) were randomly distributed in three dietary treatments (Table1) and kept for 42 days. On the last day, 2 chickens of each iteration were randomly selected, and slaughtered for taken blood sample and abdominal fat. The addition of atorvastatin and thyme to the ration reduced cholesterol, triacylglycerols, HDL, and the amount of abdominal fat (P<0.05). So, taking 7.5 g of thyme can be beneficial and effective in the production of broilers, both economically and in the health of the consumer.																																										
Table 1. Effect of atorvastatin and thyme on serum variables and abdominal fat																																											
	<table><tr><th></th><th colspan="4">Dietary treatments</th><th></th></tr><tr><th>Metabolites</th><th>Control</th><th>Atorvastatin (20mg/kg)</th><th>Thyme (7.5 g/kg)</th><th>SEM</th><th>p-value</th></tr><tr><td>Triacylglycerols(mg/dl)</td><td>72.62^a</td><td>50.62^b</td><td>56.87^b</td><td>4.29</td><td>0.0043</td></tr><tr><td>Cholesterol(mg/dl)</td><td>121.37^a</td><td>94.00^b</td><td>98.38^b</td><td>7.17</td><td>0.029</td></tr><tr><td>HDL(mg/dl)</td><td>22.92^b</td><td>36.66^a</td><td>37.43^a</td><td>2.74</td><td>0.0017</td></tr><tr><td>LDL(mg/dl)</td><td>29.33^a</td><td>18.06^b</td><td>22.68^{ab}</td><td>2.90</td><td>0.039</td></tr><tr><td>Abdominal fat (as % BodyWeight)</td><td>1.57^a</td><td>1.10^b</td><td>1.14^b</td><td>0.071</td><td>0.0002</td></tr></table>		Dietary treatments					Metabolites	Control	Atorvastatin (20mg/kg)	Thyme (7.5 g/kg)	SEM	p-value	Triacylglycerols(mg/dl)	72.62 ^a	50.62 ^b	56.87 ^b	4.29	0.0043	Cholesterol(mg/dl)	121.37 ^a	94.00 ^b	98.38 ^b	7.17	0.029	HDL(mg/dl)	22.92 ^b	36.66 ^a	37.43 ^a	2.74	0.0017	LDL(mg/dl)	29.33 ^a	18.06 ^b	22.68 ^{ab}	2.90	0.039	Abdominal fat (as % BodyWeight)	1.57 ^a	1.10 ^b	1.14 ^b	0.071	0.0002
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Poster Presentation ID: 1197

Expression of Antioxidant Genes in Broiler Chickens Fed Atorvastatin and Thyme (*Zataria multiflora* Boiss) and its Link with Pulmonary Hypertension

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ARTICLE INFO	ABSTRACT
Keywords: Antioxidant Gen expression Broilers Medicinal plants High altitude	Thyme contains a wide range of chemical constituents that confer a strong antioxidant capacity to the plant (1). The present study was intended to investigate the expression of the antioxidant gene and MDA serum of broiler chickens to thyme and atorvastatin as a chemical drug with antioxidant effects (2). A total of 360 one-d-old broilers (Ross 308) were randomly assigned to 3 dietary treatments (Table 1). Birds were reared for 6 wk in a high altitude region (2,100 m). The results showed a significant relative overexpression (target gene/YWHAZ as the arbitrary unit) of Glutathione peroxidase (GPX) and Superoxide dismutase 1 (SOD1) in the liver of the chickens fed thyme. Lipid peroxidation was significantly suppressed, as reflected in reduced circulatory concentrations of malondialdehyde (MDA) in the birds fed thyme and atorvastatin. Feeding both thyme and atorvastatin led to an upregulation of hepatic and pulmonary antioxidant genes.

Table 1. Effects of atorvastatin and thyme on hepatic gene expression and serum MDA of broiler chickens

Dietary treatments					
Gene	Control (0)	Atorvastatin (20 mg/kg)	Thyme (7.5 g/kg)	SEM	p-value
SOD1	0.011 ^b	0.535 ^a	0.456 ^a	0.11	0.026
GPX1	0.003 ^a	0.29 ^{ab}	0.40 ^a	0.097	0.044
MDA(μmol/L)	3.09 ^a	2.09 ^b	2.05 ^b	0.29	0.034

^{a,b} Means in the same row with different letter superscripts are significantly different.

Abbreviations: SOD1, superoxide dismutase 1; GPX, Glutathione peroxidase; MDA, malondialdehyde.

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Poster Presentation ID: 1198

The Effect of Salinity Stress on the Biochemical Activities of Medicinal Plants

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ARTICLE INFO

Keywords:

Salinity stress

Biochemical

Primary

Metabolites

Secondary

ABSTRACT

Soil salinity is an environmental stressor for plants. About 7% of the world's land is saline soils and 3% is salt marshes. When the plant is exposed to salt stress, the plant continues to absorb water through osmotic regulation. Proline accumulates in different parts of the plant during stress. Salinity potentially increases sugar content. Increased concentration of soluble sugars can be assessed as a response to changes in relative water content (RWC) and leaf water potential. Salinity stress rapidly affects photosynthesis and cell growth from the earliest stages. Salinity stress causes an overall reduction in plant growth and performance and disrupts essential components of photosynthesis such as photosystem II and photosystem I. Salinity stress, similar to other environmental stresses, causes the accumulation of reactive oxygen species (ROS), including superoxide, hydrogen peroxide, and hydroxyl radicals. In plant cells, ROS can damage membrane lipids, proteins, and nucleic acids. Salinity stress reduces plant protein content. Salinity causes membrane dissociation and denaturation of cell membrane lipids, and MDA accumulation can be a suitable biomarker for measuring plant response to salinity conditions. Phenolic compounds in plants act as antioxidants in scavenging oxygen free radicals produced during oxidative stress, and their increase during stress is considered one of the plant resistance strategies.

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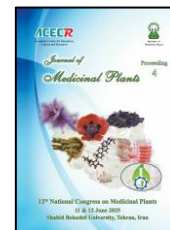
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Poster Presentation ID: 1199

Evaluating the Role of *Bacillus subtilis* in Alleviating Salt Stress in *Foeniculum vulgare*

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ARTICLE INFO

Keywords:

Bacillus subtilis

Fennel

Foeniculum vulgare

Medicinal plants

Salt Stress

ABSTRACT

Salinity stress is a major abiotic factor negatively impacting the growth and productivity of medicinal plants. These plants, valued for their therapeutic properties, experience osmotic stress, ion toxicity, and nutrient imbalances under saline conditions, leading to disruptions in physiological processes such as photosynthesis and water uptake. This study investigates the effect of *Bacillus subtilis* on *Foeniculum vulgare* (fennel), a perennial herb widely adapted to arid and coastal regions. This experiment was conducted using a randomized complete block design in the greenhouse, ensuring uniform conditions to minimize external variability and provide more reliable conclusions. Through a greenhouse experiment with 14 treatments (including seven salinity levels) and four replications, the findings indicate that fennel's tolerance to salinity significantly improves in the presence of this bacterium, achieving resistance up to 14 dS/m. Statistical analysis revealed that the treatment effects were significant at the 1% level, confirming the reliability of the results and strengthening the scientific basis for its application in real-world conditions. Furthermore, the application of *Bacillus subtilis* led to an approximately 26% increase in morphological parameters, demonstrating its positive impact on plant growth under salinity stress. Given fennel's natural sensitivity to salinity, these findings suggest that the use of biological treatments not only enhances its resistance to salt stress but also improves its adaptability to drought conditions over time, making it a viable strategy for cultivation in arid regions. These results underscore the potential of biological treatments in enhancing the sustainable cultivation of medicinal plants in saline soils, particularly in Iran, where soil salinity is a growing concern.

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Poster Presentation ID: 1200

Evaluating the Role of *Bacillus subtilis* in Alleviating Salt Stress in *Lepidium sativum*

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ARTICLE INFO	ABSTRACT
Keywords: <i>Bacillus subtilis</i> Garden cress <i>Lepidium sativum</i> Medicinal plants Salt Stress	Garden cress (<i>Lepidium sativum</i>), a rapidly growing annual herb belonging to the Brassicaceae family, is widely cultivated for its culinary and medicinal applications. Native to Southwest Asia and Egypt, this plant is valued for its distinctive peppery flavor and its richness in essential vitamins and minerals, offering notable nutritional and health benefits. Its versatility and adaptability have made it a favored choice in agricultural practices worldwide. To assess the effects of <i>Bacillus subtilis</i> on garden cress, a greenhouse experiment was conducted using a randomized block design with 14 treatments, including seven salinity levels, and four replications. These treatments involved varying salinity doses with the bacterium applied either individually or in combination. The results demonstrated a significant enhancement in garden cress's salinity tolerance in the presence of <i>Bacillus subtilis</i>, allowing it to withstand salinity levels of up to 14 dS/m. This study highlights the potential of biological treatments to support the sustainable cultivation of medicinal plants, particularly in saline soils, thereby addressing agricultural challenges in regions like Iran

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Poster Presentation ID: 1201

Quantitative and Qualitative Changes in the Leaf Essential Oil of Persian Turpentine Tree (*Pistacia atlantica* ssp. *kurdica*) as Affected by Different Harvesting Times

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ARTICLE INFO

Keywords:

Developmental stage

Pistacia atlantica

Essential oil

α -Pinene

ABSTRACT

The Persian turpentine tree (*Pistacia atlantica* ssp. *kurdica*) is a significant wild subspecies within the *Pistacia* genus, primarily found in the western and southwestern areas of Iran. Its different organs include leaf, inflorescences, fruit and gum are utilized as foods and in the folk medicine for digestive health, antioxidant and anti-inflammatory properties, antimicrobial activity, diabetes and blood sugar regulation, cardiovascular health, wound healing and skin conditions, and respiratory benefits. Like in any other essential oil bearing plants, one of the most important characteristics of oil accumulation in *Pistacia* species is its dependence on the developmental (ontogenetic) stage. In this study, quantitative and qualitative variations in the essential oil of *P. atlantica* ssp. *kurdica* trees were studied in response to different harvesting times (June, July and August). Plant material (Leaves from male and female trees) were harvested from its natural habitats in Sanandaj. The essential oil of air-dried leaves was isolated by water distillation using a Clevenger-type apparatus and was analyzed by Gas Chromatography (GC) and Gas Chromatography-Mass Spectrometry (GC/MS). The results showed that there was no significant difference between male and female trees for leaf essential oil content. Also, the leaf essential oil content increased during the growing season, with the highest (0.33% (male tree) and 0.31% (Female tree)) and lowest (0.19% (male tree) and 0.17% (female tree)) essential oil content were recorded in August and June, respectively. α -Pinene was the main component of the leaf essential oil in both male (21.95% (June), 30.57% (July) and 33.90% (August)) and female (45.73% (June), 37.95% (July) and 42.22% (August)) trees. The findings of this study indicated that to obtain the maximum essential oil content and the highest α -Pinene levels in the essential oil, leaves must be collected in August.

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Poster Presentation ID: 1202

Effect of Foliar Application of Salicylic Acid on Growth, Chlorophyll Content and Photosynthetic Parameters of Olive under Drought Stress

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ARTICLE INFO	ABSTRACT
Keywords: Water deficit stress <i>Olea europaea</i> Growth parameters Chlorophyll Stomatal conductance	The olive tree (<i>Olea europaea</i> L.) is an ancient crop that has been cultivated in Iran for many years for medicinal and nutritional purposes. This tree is generally known to be a drought-resistant crop; however, it is now threatened by climate change. Iran is one of the world's most vulnerable regions to climate change effects, especially drought stress. This demonstrates the importance of finding different methods that can aid in alleviating drought stress. Accordingly, for assessing the effects of Salicylic acid (SA) treatment (as foliar application at concentrations of 0, 1 and 3 mmol L⁻¹) on growth characteristics, chlorophyll content, and photosynthetic parameters of three-years old saplings of two olive cultivars (Koroneiki and Dezfuli) exposed to three irrigation intervals (5, 10, and 15 days), a pot experiment was performed in factorial based on randomized complete blocks design with three replications. The results showed that with decreasing water supply, growth indices (plant height, leaf number and area, stem diameter, fresh and dry weight of leaf, stem and root), chlorophyll content (a, b and total chlorophyll) and photosynthetic parameters (net photosynthesis rate (P_n), transpiration rate (E) and stomatal conductance (g_s)) in both olive cultivars decreased. However, olive saplings that were treated with SA, particularly at a concentration of 1 mmol L⁻¹, exhibited improved growth indices, increased chlorophyll content, and enhanced photosynthetic parameters. These results indicate that treatment of olive saplings with SA improves drought-stress tolerance by improving the growth, chlorophyll content and photosynthetic performance.

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Poster Presentation ID: 1203

Physiological, Biochemical, and Antioxidant Responses of Olive to Foliar Application of Salicylic Acid under Water Deficit Stress

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ARTICLE INFO	ABSTRACT
Keywords: Drought stress <i>Olea europaea</i> Relative water content Proline Antioxidant enzymes	Drought is one of the most devastating environmental stresses, limiting the productivity of crops. Salicylic acid (SA) is a promising phenolic compound that has received much attention due to its role in plant resistance to various environmental stresses such as drought. The olive tree (<i>Olea europaea</i> L.) is an ancient crop that has been cultivated in Iran for many years for nutritional and medicinal purposes. Although olive naturally tolerates drought, studies had shown that drought stress undermines its growth and yield. This study was focused on the changes in water relations, compatible solutes accumulation, and antioxidant systems of two olive cultivars (Koroneiki and Dezfuli) in response to the foliar application of SA (at concentrations of 0, 1 and 3 mmol L⁻¹) under drought stress conditions (three irrigation intervals include 5, 10, and 15 days). Accordingly, a pot experiment was performed in factorial based on randomized complete blocks design with three replications. The results showed that relative water content (RWC) decreased in response to drought stress. Also, leaf temperature, malondialdehyde (MDA) content, compatible solutes accumulation (proline, total soluble solids (TSS) and glycine betaine (GB)), total protein content, and antioxidant enzymes activity (catalase (CAT), ascorbate peroxidase (APX) and guaiacol peroxidase (GPX)) decreased as water availability diminished. Foliar application of SA had no significant effect on proline, total protein and malondialdehyde content and GPX activity. However, olive saplings that treated with SA, exhibited enhanced TSS and activity of CAT and APX enzymes. The findings of this research indicated that olives alleviate drought stress by promoting the accumulation of compatible solutes and enhancing the antioxidant defense mechanisms. The results of this study also showed that SA application aids in alleviating the impacts of drought stress on olives by enhancing the accumulation of TSS and boosting the antioxidant enzymes activity.

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Poster Presentation ID: 1204

The Effectiveness of *Zingiber zerumbet* Ointment Compared to Diclofenac Gel on Clinical Symptoms of Patients with Knee Osteoarthritis: A Double-Blind Randomized Controlled Trial

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ARTICLE INFO	ABSTRACT
Keywords: Knee osteoarthritis Iranian medicine <i>Zingiber zerumbet</i> ointment	Osteoarthritis is a joint disease in which cartilage and bone tissue are gradually destroyed. The disease is a global problem and its prevalence is higher in Asia than Europe and the United States. According to WHO recommendation on the use of medicinal plants in the regional nature of any country, the present study aimed to evaluate the effectiveness of <i>Zingiber zerumbet</i> ointment compared with Diclofenac gel on clinical manifestations of patient with knee osteoarthritis. The present double-blind clinical randomized controlled trial (RCT) was conducted on patients with knee osteoarthritis in Tehran (Iran) from February 2017 to September 2018. In the present study, the first group (intervention) consumed <i>Zingiber zerumbet</i> ointment and the second group (positive control) consumed diclofenac gel at a dose of 1g every 8 hours for 4 consecutive weeks. In the study, the severity of symptoms (pain, stiffness and physical functioning) were considered as the initial outcomes by the WOMAC (Western Ontario and McMaster Universities Arthritis Index), and the experimental tests, namely the CBC, Cr, BUN, ALP, ALT, AST, CRP, IL1, and IL6 were considered as secondary outcomes of study. The present study was conducted on 92 patients with osteoarthritis (drug group: 48 individuals; positive control group: 44 individuals). In the present study, two groups were similar in terms of demographic characteristics. The research results indicated differences in scores of physical functioning (MD drug group=-11.94, MD of control+ group=-6.43, P<0.001), pain (MD drug group=-3.94, MD of control+ group=-2.43, P-value=0.039), Stiffness (MD drug group=-1.31, MD of control+ group=-0.91, P-value=0.135). Furthermore, further results indicated that except for CPR and Bun variables, other Laboratory variables had no significant changes in two groups, <i>Zingiber zerumbet</i> ointment and Diclofenac gel. Given that <i>Zingiber zerumbet</i> ointment has an herbal base and its use in reducing symptoms of osteoarthritis is very simple and effective.

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Poster Presentation ID: 1207

Development of Alginate-Nanoparticles for the Stabilization and Delivery of Bioactive Extracts from *Melissa officinalis*

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ARTICLE INFO

Keywords:

Melissa officinalis
Encapsulation
Spray Dryer
Drug delivery

ABSTRACT

Melissa officinalis is widely recognized as a medicinal plant with anxiolytic, sedative, cognitive-enhancing, anti-inflammatory, and antioxidant properties. It has both traditional and modern applications in improving sleep quality, digestive health, skin conditions, and cardiovascular function. Spray-drying encapsulation technology provides an effective means to enhance the stability and bioavailability of these active constituents. This research represents an important advancement toward the development of stable, high-efficiency natural products based on *M. officinalis* extract. This study investigates the optimization of the extraction process and nanoencapsulation of *M. officinalis* extract using the spray-drying method and sodium alginate as the encapsulating polymer. Aqueous and hydroalcoholic extracts containing bioactive compounds such as rosmarinic acid known for their antioxidant, anxiolytic, antiviral, and cognitive-enhancing properties were prepared. Key spray-drying parameters, including inlet temperature, atomization pressure, and airflow rate, were optimized to produce nanoparticles ranging from 600 to 1600 nm in size, with high encapsulation efficiency. The results indicated that the optimal conditions (115 °C inlet temperature, 4 bar pressure, and 100 cm³/s airflow rate) yielded nanoparticles with an average size of approximately 620 nm and an encapsulation efficiency of 88.6%, along with enhanced antioxidant activity. FTIR and DSC analyses confirmed strong interactions between polyphenols and alginate, as well as improved thermal stability. Drug release studies demonstrated a controlled release profile of polyphenols under simulated gastric and intestinal conditions. These findings highlight the significant potential of alginate-based nanoencapsulation for preserving the bioactivity and stability of phenolic compounds derived from *Melissa officinalis*, with promising applications in pharmaceutical and functional food industries.

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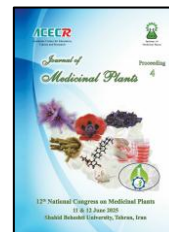
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Poster Presentation ID: 1208

Polymeric Nano Capsules Containing Spirulina Extracted Phycocyanin Anti-Diabetic Ulcer Effect

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ARTICLE INFO

Keywords:

Diabetes
Spirulina
Nano capsules
Phycocyanin
Ulcer
Diabetic bacteria

ABSTRACT

Background: Diabetes mellitus is a global health issue today, and diabetic ulcers occur in approximately 18.6 million individuals annually. (Tan, 2024) Diabetic ulcers result directly from sustained hyperglycemia due to deranged insulin action. Fundamental treatment includes debridement, infection control, pressure relief, and specialist care. Wound dressings are a significant component of the therapy, tailored to wound characteristics like site, exudate, and inflammation. (Tan, 2024) Spirulina, an antioxidant-rich microalga, exhibits anticancer, antioxidant, and anti-inflammatory properties and can be a prospective natural drug in the treatment of diabetes and diabetes-related complication. (Kumar & Wattal, 2014) Its bioactive molecules are nevertheless unstable and insoluble. This issue can be addressed by nano-encapsulation with the stabilization of molecules, promotion of delivery, and regulation of release. (Miguel et al., 2024) This current study aims to develop a Spirulina-derived wound dressing for inhibiting bacterial growth on diabetic ulcers. Methods: An experiment was designed using by central composite design to extract Spirulina. Twenty-two extraction was done by ultrasonic based on 3 factors: ethanol as solvent in different percentages (60%, 70%, 80%, 90%, and 100%), different time (30, 45, 60, 100, and 120 minutes), and ultrasonic power (low and high). Then, optimization of extracts was calculated by delta mass. Afterward, the Bradford test was completed to measure protein concentration. Also, the sulfuric acid-phenol test was performed to measure carbohydrate concentration. Result: Optimization of extracts was calculated with the highest results being 2.6mg and 2.3mg, which were for extraction in run 9, 70% ethanol, 100min, high-power, and run 22, 80% ethanol, 60min, high-power sonication in order. Significant amounts of protein were measured in run 20 (35.14201µg/g) and run 16 (15.03966µg/g). Also, the result of the sulfuric acid-phenol test showed a great amount of carbohydrate in run 11 (21.1178µg/g) and run 14 (19.3333µg/g). Conclusion: Runs 11, 14, 16, and 20 show promising amounts of protein and carbohydrate to use these extractions to observe the anti-diabetic ulcer bacteria effect.

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Poster Presentation ID: 1209

Cytokinin change growth traits of *Hibiscus sabdariffa* seeds under different NaCl concentrations

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ARTICLE INFO	ABSTRACT
Keywords: Growth Hormone salinity Seed germination Sour tea	This research was conducted to study the effect of seed pretreatment on seed germination indices under salt stress conditions in the laboratory of the Department of Horticultural Sciences, Faculty of Agriculture, Ferdowsi University of Mashhad in 2024. The research treatments included priming at three levels (no seed pretreatment, 100 μL cytokinin, 200 μL cytokinin), and salinity stress at four levels (0, 4, 8, and 12 dS/m NaCl). This research was conducted as a factorial based on a completely randomized design with 3 replications. Sour tea seeds were prepared by disinfection with sodium hypochlorite and pretreatment with cytokinin for 24 hours at 4°C. Then, the treated seeds in a Petri dish with NaCl medium put in a germinator at 25°C. The germination and seedling indices were monitored over 14 days. The traits studied in this study included: seed germination indices (germination percentage and rate, average seed germination time, seed vigor index, allometric coefficient) and morphological indices (shoot and root length, shoot and root fresh weight, and total fresh and dry weight). The application of salinity stress led to a decrease in seed germination indices and a decrease in the growth of sour tea seedlings [1]. The results of this study showed that increasing the salinity concentration to 12 dS/m had a significant effect on reducing the growth indices in sour tea seedlings. It significantly reduced the germination percentage, germination rate, average daily germination, seed vigor index and allometric coefficient, root fresh weight and shoot fresh weight. Seed priming with cytokinin resulted in increasing shoot and root length, shoot fresh weight, and root fresh weight in 4 and 8 dS/m NaCl treatment. In general, cytokinin at both concentrations (100 and 200 μL) was effective in improving the growth of sour tea seedlings under salinity both stress conditions (4 and 8 dS/m) [1,2].

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Poster Presentation ID: 1210

Effect of salinity stress and proline priming on biochemical properties of sour tea seeds

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ARTICLE INFO

Keywords:

Biochemical traits
Hibiscus sabdariffa
Proline
Priming

ABSTRACT

This study was conducted to investigate the effect of hormonal pretreatments and salinity conditions on germination and biochemical properties of sour tea (*Hibiscus sabdariffa*) seeds in the laboratory of the Department of Horticultural Sciences, Faculty of Agriculture, Ferdowsi University of Mashhad in 2024. The research treatments included priming at three levels (no seed pretreatment, 50 μ L proline, 100 μ L proline), and salinity stress at four levels (0, 4, 8, and 12 dS/m). This research was conducted as a factorial based on a completely randomized design with 3 replications. Sour tea seeds were prepared by disinfection with sodium hypochlorite and pretreatment with proline for 24 hours at 4°C. Then, the seeds were placed in a Petri dish in NaCl medium and cultivated in a germinator at 25°C. Germination and seedling indices were evaluated over 14 days. The studied traits were peroxidase enzyme activity, total protein content, plant proline content, malondialdehyde content, total phenol content, and guaiacol peroxidase enzyme. The results of the analysis of variance showed that the interaction effect of salinity and seed pretreatment using proline at a concentration of 50 μ M increased the activity of the peroxidase enzyme by 44% compared to the treatment. Seed pretreatment with proline led to an increase in protein content compared to the treatment of no seed pretreatment at the same salinity level (4 dS/m) (1). The content of malondialdehyde in the plant showed that salinity levels of 4 and 8 dS/m increased the content of malondialdehyde in the plant. Salinity levels of 4 and 12 dS/m resulted in a significant increase in total phenol content in the plant. Applying salinity stress at levels of 4, 8, and 12 dS/m increased the activity of the guaiacol peroxidase enzyme in the plant by 200%, 200%, and 250%, respectively, compared to the treatment without applying salinity stress (2).

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Poster Presentation ID: 1211

Evaluation of Morphological and Physicochemical Characteristics of *Perovskia abrotanoides* Karel from Four Natural Habitats

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ARTICLE INFO	ABSTRACT
Keywords: Chlorophyll Herbarium codes Leaf area Leaf number Phenological	<i>Perovskia abrotanoides</i> Karel, commonly known as Golkabood or Barazambal, belongs to the Lamiaceae family and is a medicinal-ornamental plant valued for its various applications in pharmaceutical, food, cosmetic, and hygiene industries. This study investigated the influence of environmental conditions on the morphological traits (leaf area and leaf number) and physiological parameters (chlorophyll a, b, total chlorophyll, chlorophyll a/b ratio, and carotenoids) of this species. Sampling was conducted during three phenological stages (pre-flowering, flowering, and flowering shoot) in spring and summer 2023 from four different regions: Golmakan (Razavi Khorasan), Chaman Bid (North Khorasan), Miami (Semnan), and Tilabad (Golestan). Herbarium codes were obtained for each sample from Ferdowsi University of Mashhad: Chaman Bid (FUMH9921), Golmakan (FUMH9922), Miami (FUMH9923), and Tilabad (FUMH9924). The experimental design was a completely randomized design with three replications. Data analysis was performed using JMP software (version 8), and Tukey's HSD test was used for mean comparison. Graphs were generated in Microsoft Excel. The results revealed that the highest leaf area was recorded in the Golmakan region (28.4 cm²), while the lowest was observed in Miami, Tilabad, and Chaman Bid. In terms of physiological traits, the highest chlorophyll a content was found in Tilabad (0.722 mg/g FW), and the highest chlorophyll b in Golmakan (0.572 mg/g FW). The highest and lowest chlorophyll a/b ratios were observed in Maraveh Tappeh (1.663) and Golmakan (1.04), respectively. Total chlorophyll content was highest in Tilabad (1.324 mg/g FW) and Golmakan (1.301 mg/g FW). To investigate the effect of environmental and climatic conditions on the morphological and physiological characteristics of <i>Perovskia abrotanoides</i>. The results indicated that environmental conditions significantly affected the morphological and physicochemical traits of the studied plant.

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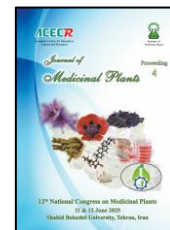
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Poster Presentation ID: 1212

Morphophysiological and Physiological Traits of *Perovskia abrotanoides* Karel in Different Ecological Regions of Iran

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ARTICLE INFO

Keywords:

Carbohydrate
Electrolyte leakage
Environmental
conditions
Proline
Root parameters

ABSTRACT

Perovskia abrotanoides Karel, commonly known as "Golkabood" or "Barazambel," belongs to the Lamiaceae family and is a medicinal and ornamental plant widely used in the food, pharmaceutical, cosmetic, and hygiene industries. Plant specimens were collected from four regions in Iran: Golmakan (Razavi Khorasan), Chaman Bid (North Khorasan), Miami (Semnan), and Tilabad (Golestan). For each specimen, a herbarium code was obtained from Ferdowsi University of Mashhad: Chaman Bid (FUMH9921), Golmakan (FUMH9922), Miami (FUMH9923), and Tilabad (FUMH9924). This study evaluated morphophysiological traits (root length, fresh and dry root weight, root diameter, and root surface area) and physiological traits (carbohydrate content, electrolyte leakage, and proline content). The experiment was conducted in a completely randomized design with three replications during the spring and summer of 2023. Statistical analyses were performed using JMP 8 software. Mean comparisons were carried out using Tukey's test, and charts were drawn using Excel. Analysis of variance revealed that regional differences had no statistically significant effect on root traits such as length, diameter, or fresh and dry weight. However, differences were observed in root surface area, with the lowest values recorded in Chaman Bid (3.43 cm²) and Golmakan (3.38 cm²), and the highest in Maraveh Tappeh (4.6 cm²). Carbohydrate content was highest in Golmakan (0.432 mg/g dry weight) and lowest in Miami (0.344 mg/g dry weight). The highest leaf electrolyte leakage was recorded in Chaman Bid (18.23%), while the lowest was observed in Golmakan (14.18%). The highest proline content was measured in Miami (0.279 mg/g dry weight), with the lowest found in Tilabad. This study aimed to evaluate the effects of environmental conditions across different regions on the morphological and physiological characteristics of *Perovskia abrotanoides*, with the goal of identifying the most suitable regions for optimal growth and utilization of this valuable medicinal plant. The results demonstrated that the environmental conditions of different regions significantly influence the physiological and nutritional characteristics of the plant and its soil, highlighting the importance of region-specific strategies for cultivation and resource management.

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Poster Presentation ID: 1214

Investigation of Growth and Phenolic Content of *Arctium lappa* L. in Perlite and Rockwool Substrates Under Soilless Cultivation

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ARTICLE INFO	ABSTRACT
Keywords: <i>Arctium lappa</i> L. Perlite Phenolic Content Rockwool Soilless cultivation	<i>Arctium lappa</i> L. is a biennial plant from the Asteraceae family that is used to treat diabetes, gastrointestinal diseases, skin disorders, blood purification, and serves as an alleviator of pain and inflammation. Soilless cultivation is an innovative and alternative to conventional soil-based systems that produces high-quality medicinal plants in a controlled environment. In this study, the effects of two soilless substrates, perlite and rockwool, on growth indices and phenolic content in <i>A. lappa</i> were investigated. The results showed that the rockwool substrate performed better than perlite in height, as well as the fresh and dry weights of shoot parts and phenolic content, this superior performance is attributed to rockwool ability to retain sufficient moisture, which facilitates the growth of shoot and ensures continuous nutrient availability for the plant. In contrast, the fresh weight, dry weight, and root height were observed to be reduced in the rock wool substrate compared to perlite, as perlite's porous structure provides better aeration and facilitates faster nutrient absorption by the roots. This difference indicates greater root development in perlite, which allows the shoot better access to water and nutrients in rockwool. No significant difference in relative water content was observed between the two substrates.

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Poster Presentation ID: 1215

Seasonal changes in essential oil content and composition of Guava (*Psidium guajava* L.); an excellent source of β - caryophyllene

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ARTICLE INFO	ABSTRACT
Keywords: Anti-inflammatory Harvest time Limonene Nerolidol Leden	Secondary metabolites from plants are novel sources of raw material for pharmaceuticals, cosmetic, perfume and food industrials [1]. <i>Psidium guajava</i> L., belongs to Myrtaceae family, is one of the most effective plants used for their therapeutic effects [2]. Pharmacological investigations indicated that its bark, fruits and leaves possess antibacterial, hypoglycemic, anti-inflammatory, antipyretic antitussive, antiallergic, antinociceptive, antioxidant, antidiarrheal, hepatoprotective, antimicrobial, antiparasmodial, antispasmodic, spasmolytic, and antidiabetic activities [3]. In present research, Guava leaves were harvested in the middle of month of each season. The samples were dried in shade and room temperature, and essential oil was extracted by Clevenger apparatus. The oil components were analysed by GC-MS. Essential oil content ranged from 0.9-1.03%. However, the plant had more essential oil in spring and autumn than summer and winter. Limonene, alpha copaene, trans caryophyllene, (+)-aromadenderene, ledene, nerolidol and humulene epoxide II were the main oil components. Trans caryophyllene was ranged from 12.84 to 31.01%. The highest amount (31.01%) was found in spring and after a significant decrease in summer (12.84%), It increased again in autumn and winter. The same trend was observed in ledene. In contrast, veridiflorol followed the opposite flow and increased during the summer. In general, guava leaf can be considered an excellent source of trans caryophyllene and spring harvest time is recommended.

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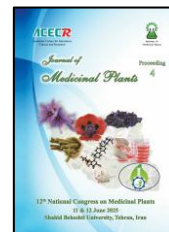
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Poster Presentation ID: 1216

Antiradical and UV-B Protective Activities of Leaf Extracts of Olive Cultivars Cultivated in Khuzestan Province at Different Harvest Times

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ARTICLE INFO

Keywords:

Antiradical capacity
Flavonoid
Phenolic compounds

ABSTRACT

Olive (*Olea europaea*) leaf extract is best known as powerful antioxidant due to its high content of phenolic compounds [1]. To investigate the antiradical and UV-B protective activities of leaf extracts of olive cultivars cultivated in Khuzestan province at different harvest times, a factorial experiment was conducted as a randomized complete block design with three replications in the research field of Shahid Chamran University of Ahvaz in 2024-2025. The experiment factors were included Olive cultivars (Conservalia, Mishen, Kroniki, Manzanila, Foji, Zard, Mari, Dezfoli, Balidi, Roghani, Kaesi, Khoseari, Kavi, Masabei, Abosat, Kaylit, T2, T5, T7 and T21) and harvest times (summer and winter seasons). The traits included total phenolic (TPC), flavonoid (TFC), flavone and flavanol contents (TFFC), antiradical capacity (AC), and UV-B protective activity (UA). According to the results, TPC, TFC, TFFC and AC of the studied genotypes increased significantly in winter. The maximum amounts of TPC and AC were recorded in Manzanila, Balidi, Zard, and Foji cultivars, respectively, and Manzanilla leaf extract was the strongest at UA level. The Kroniki and Manzanilla leaf extracts contained the highest contents of TFC and TFFC, respectively. Therefore, it seems that harvesting the leaves of Manzanila, Balidi, Zard, and Foji cultivars in the winter season can help provide better access to the therapeutic properties.

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Poster Presentation ID: 1217

Effect of licorice (*Glycyrrhiza glabra* L.) on performance, immune response and some blood parameters in broilers

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ARTICLE INFO

Keywords:

Licorice
Performance
Immune response
Blood parameters
Broiler

ABSTRACT

An experiment was conducted to investigate the effect of licorice (*Glycyrrhiza glabra* L. root) on performance, immune response, some blood parameters in male broilers. 240 one-day-old (Ross 308) male broiler chicks were randomly allocated to four experimental groups, each with three replications and 20 birds in each replicate. Experimental groups were consisted of 1- Basal diet without any additives (Control-), 2- Basal diet +1 g/Kg licorice, 3- Basal diet + 2.5 g/Kg licorice and 4- Basal diet+ 5 g/Kg licorice. Feed consumption, weight gain and feed conversion ratio of experimental groups were recorded. The birds were vaccinated against Newcastle disease (ND) via drinking water at days 9 and 23. At days 42, three birds were selected from each experimental group and blood samples were collected to survey ND titer, humoral immune and some blood parameters. Evaluation of performance showed that licorice increased feed intake and body weight gain and consequently improved feed conversion ratio in weeks 6 and 7. But growth parameters were not significantly different among experimental group containing licorice. Comparing with control, serum concentrations of glucose, LDL, triglyceride, cholesterol were decreased by licorice supplementation at all three tested levels ($P < 0.05$). Moreover, dietary supplemental of licorice caused significant increases in albumin and HDL concentrations and antibody titer against Newcastle disease virus and SRBC ($P < 0.05$). Licorice at level of 5 g/Kg caused a significant increase in hematocrit, MCV, and differential lymphocyte and heterophil count ($P < 0.05$). These results showed that licorice at level of 2.5 g/Kg improved growth performance and also were seen more beneficial and positive effects on immune response and blood biochemical parameters of broilers fed licorice at level of 5 g/kg.

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Poster Presentation ID: 1220

Antioxidant Effects of Silver Nanoparticles Synthesized using *Berberis integerrima* Root Extract

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ARTICLE INFO

Keywords:

Berberis integerrima

Silver Nanoparticles

Antioxidant

ABSTRACT

In this study, *Berberis integerrima* root extract was used as a reducing and stabilizing agent for the production of silver nanoparticles (BI-AgNPs). Briefly, 10 ml of silver nitrate solution (Mm 1) was mixed with 500 µl of the aqueous extract at room temperature. The color change of the solution and the production of nanoparticles began 30 minutes after mixing. The color change of the solution to light brown indicated the production of nanoparticles. Then, the physicochemical properties of BI-AgNPs were investigated using UV-vis spectra and transmission electron microscopy. Then, its antioxidant effects were evaluated using ABTS and DPPH methods. To perform antioxidant assay, 50 µl (10 to 100 µg/ml) of BI-AgNPs were mixed with 250 ml of ABTS or DPPH and the absorption of the samples in each sample was measured. Then, the percentage of antioxidant activity of the sample was calculated using the following formula. Free radical inhibition percentage = [(sample absorption - control absorption)/control absorption] × 100. BSA was used as a standard antioxidant. The synthesized nanoparticles had maximum absorption in the 460 nm. These nanoparticles were spherical in shape and their average size was reported to be 47 nm. Antioxidant assay showed BI-AgNPs had a high capacity to inhibit free radicals in a concentration-dependent manner. So that these nanoparticles at concentrations of 80 and 60 µg/ml caused 50% inhibition of free radicals in ABTS and DPPH tests, which was higher than the standard antioxidant BSA. The increase in antioxidant activity could be due to the increased contact surface and greater stability of plant active compounds on the surface of the nanoparticles (1). In conclusion: the use of *Berberis integerrima* extract in the synthesis of nanoparticles can be effective for producing compounds with high antioxidant properties that have potential applications in the pharmaceutical and food indiscretions.

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Poster Presentation ID: 1221

The Antimicrobial Effects of Ethanolic Extract of *Narcissus tazetta* L. on Antibiotic-resistant Strains of *Staphylococcus aureus*

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ARTICLE INFO	ABSTRACT
Keywords: <i>Narcissus tazetta</i> L. Ethanolic Extract <i>Staphylococcus aureus</i> Minimum inhibitory concentration	As awareness of the side effects of chemical drugs grows, there has been a rising trend in the use of medicinal plants and their products. <i>Narcissus tazetta</i> L. is a perennial flowering plant belonging to the Amaryllidaceae family. The significance of this flower in traditional medicine, attributed to its various bioactive compounds, suggests its potential as a source of natural remedies. This study investigates the antimicrobial effects of ethanolic extract of <i>Narcissus</i> flowers on antibiotic-resistant strains of <i>Staphylococcus aureus</i>. Extraction was performed using the percolation method, and 17 strains of <i>Staphylococcus aureus</i> were obtained from the Pasteur Institute. The results indicated significant antibiotic resistance among the isolated <i>Staphylococcus aureus</i> strains, with resistance rates of 89.4% to penicillin, 83.2% to erythromycin, 82.3% to cefexime, 70.4% to trimethoprim, 70.5% to ampicillin, 29.5% to ceftazidime, 29.7% to tetracycline, 23.5% to ceftriaxone, and 6.2% to amikacin. Furthermore, the ethanolic extract of <i>Narcissus</i> flowers exhibited the highest inhibitory effect on the growth of <i>Staphylococcus aureus</i> at a concentration of 1.6 mg/mL. Additionally, concentrations of 6.4 mg/mL and 12.8 mg/mL demonstrated the most potent lethal effects against the bacteria. These findings suggest that the ethanolic extract of <i>Narcissus</i> has considerable potential as an antimicrobial agent against antibiotic-resistant <i>Staphylococcus</i>.

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Poster Presentation ID: 1222

The Effect of *Echium plantagineum* on Diabetic wound healing in animal models (rats)

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ARTICLE INFO	ABSTRACT
Keywords: <i>Echium plantagineum</i> Lesions Histopathology Wounds	Oxidative stress and inflammation are key contributors to the development of diabetic wounds. Diabetes mellitus, a widespread chronic disease often complicated by severe wound infections. This study aimed to assess the anti-inflammatory and antioxidant properties of <i>Echium plantagineum</i> (commonly known as purple viper's bugloss) in promoting diabetic wound healing. The plant's sap contains phenolic compounds, which are believed to mediate its therapeutic effects against oxidative stress and inflammation. To establish a reliable wound healing model, we refined existing protocols by optimizing parameters such as animal selection (male Wistar rats), diabetes induction (streptozotocin), wound creation, infection control, and wound assessment. Rats were housed under controlled conditions (20–22 °C, 50–70% humidity) with ad libitum access to food and water. All animals divided to four groups: The control group was untreated, The group treated with sulfadiazine ointment, The Eucerin group, and the group that received the plant extract along with Eucerin. <i>Echium plantagineum</i> pollen was extracted using methanol-water (7:3), ultrasonicated, centrifuged, and analyzed via HPLC for phenolic content. The results of this study showed that wound healing in the group treated with plant extract plus eucerin was significant and better than the control and eucerin treatment groups ($P < 0.05$), but there was no significant improvement in wound healing compared to the group treated with sulfadiazene. The advantage of using this plant include easy material accessibility, technical simplicity, high reproducibility, and scalability for large-sample studies. Given the close similarity of skin wound healing in rats to human wound healing processes, this model serves as a valuable tool for research in diabetic wound management. Findings of this study highlight <i>Echium plantagineum</i>'s potential as a therapeutic agent, supporting further investigation into its mechanisms and clinical applications.

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Poster Presentation ID: 1223

The Effect of *Vaccinium vitis-idaea* extract on histopathological skin lesions caused by Herpes Virus

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ARTICLE INFO	ABSTRACT
Keywords: <i>Vaccinium vitis-idaea</i> Lesions Histopathology Wound	Red lingonberry, or <i>Vaccinium vitis-idaea</i>—also known as cowberry or mountain cranberry is a red fruit with a cranberry-like taste but less sourness. Rich in antioxidants and nutrients, it supports weight control and cardiovascular health. Mucocutaneous lesions can appear in various forms and come with numerous complications, so their early identification seems essential to reduce symptoms, reduce pain, minimize disability, and reduce the need for strong medications. In some cases, the first signs of systemic disease may appear in the mouth, which makes timely detection by dental professionals especially important. Deep skin wounds often Repair slowly due to impaired tissue healing so extending the recovery period. As a result, finding effective treatments that speed up healing is an important goal. This study investigated the potential of red lingonberry extract to help skin healing lesions caused by Herpes. Thirty male BALB/CC mice were used in this study. The mice were divided into three groups: a control group treated with Eucerin and two experimental groups treated with a mixture of 1.5 and 3% red gooseberry extract mixed with Eucerin. In all mice, two uniform, circular, full-thickness wounds (7 mm in diameter) were created on the back of the mice. Treatment began immediately after wound formation and continued for 16 days. Microscopic analysis over the 16-day period focused on re-epithelialization and wound closure. The group treated with the 3% extract showed notably greater wound contraction than the control group ($p<0/05$). Additionally, animals treated with 3% extract of <i>Vaccinium vitis-idaea</i> showed reduced infiltration by inflammatory cells, more blood vessel formation (angiogenesis), increased fibroblast growth, greater collagen deposition, and thicker epithelial tissue.

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Poster Presentation ID: 1224

Effectiveness of Anti-Diabetic Plants Combination Used in Persian Medicine on Blood Glucose Control in Type 2 Diabetic Patients: A Placebo-Controlled Clinical Trial

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ARTICLE INFO

Keywords:

Persian Medicine
Medicinal plants
Type 2 diabetes
Clinical trial
Herbal combination

ABSTRACT

In Persian Medicine, herbal therapists prescribe several herbs with different combinations for treatment of diabetic patients (1). Among these plants, an herbal combination including *Silybum marianum* L., *Melissa officinalis* L., *Vaccinium arctostaphylos* L., *Trigonella foenum-graecum* L., *Urtica dioica* L., and *Citrullus colocynthis* L. is prescribed for treatment of diabetic patients by some herbalists. The present study was performed to investigate the efficacy and safety of this herbal combination on the blood glucose control in type 2 diabetic patients. The herbal combination and placebo capsules (500 mg) were provided by the Institute of Medicinal Plants. Sixty eligible type 2 diabetic patients referred to the Diabetes Research Center affiliated to the Alborz University of Medical Sciences were selected. Patients were randomly divided into two groups of 30 people. Patients in both groups continued their standard anti-diabetic therapy. In addition, one group was administered one 500 mg herbal capsule and the other group placebo capsule every 12 hours for three months. The blood biochemical tests including, fasting blood (FBG) glucose, glycosylated hemoglobin, lipid profile, creatinine, urea and liver enzymes including SGOT, SGPT, ALP were performed at the baseline, and then, at the end of the study after 3 months. The results showed that the fasting blood glucose level and glycosylated hemoglobin in the patients treated with herbal combination decreased significantly after 3 months compared with the baseline and also the placebo ($p = 0.000$). No significant ($p > 0.05$) changes were observed in the blood lipid profile, liver enzymes and kidney function tests. No side effects were observed during the study in both groups. In conclusion, the present study showed that, consumption of this herbal combination for 3 months has anti-diabetic effect without any side effects.

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Poster Presentation ID: 1225

Antidiarrheal Efficacy of *Sophora alopecuroides* L. var. *Alopecuroides* Seed Extract Similar to Loperamide Efficacy via Matrine in Castor Oil-Induced Diarrhea Mouse Model

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ARTICLE INFO	ABSTRACT
Keywords: <i>Sophora alopecuroides</i> Quinolizidine alkaloid Matrine Antidiarrheal Castor oil	The <i>Sophora alopecuroides</i> L. var. <i>alopecuroides</i> seeds (SAAS) are traditionally used for the treatment of diarrhea and opioid withdrawal. Also, they have reduced the diarrhea and other signs and symptoms of acute opioid withdrawal in preclinical and clinical studies. This study aimed to test the antidiarrheal effects of the SAAS 90% ethanol total extract against loperamide in the castor oil-induced diarrhea mouse model, and the roles of the SAAS alkaloid fraction and matrine in the effects. Additionally, the quinolizidine alkaloids of the alkaloid fraction were quantitated by GC (gas chromatography) and GC-MS (gas chromatography-mass spectrometry). Male Swiss albino mice weighing 25-30 g were used. Each mouse was individually placed on a blotting paper in a cage after an overnight fasting. Normal saline (5 mL/kg), loperamide (3 mg/kg), total extract (100, 200, 300 mg/kg), alkaloid fraction (5, 10, 20 mg/kg), and matrine (5, 15, 30 mg/kg), each dissolved in 5 mL/kg of normal saline, were given by gavage to each mouse in a group of 10 mice, 0.5 hour before gavage of 0.3 mL of castor oil. Afterward, their effects on the following parameters were measured during 4 hours: time of diarrhea onset, total number of wet feces, total weight of wet feces, and total number of feces. The total extract, alkaloid fraction and matrine improved the diarrhea parameters significantly versus normal saline ($P < 0.001$ for all comparisons), and with efficacy similar to loperamide efficacy. The alkaloid fraction contained matrine (25.9%), cytisine (23.4%), sophoridine (15.2%), n-methyl cytisine (12.5%), and sophocarpine (7.8%). In conclusion, the SAAS may have antidiarrheal efficacy similar to loperamide efficacy, mediated by matrine, in the castor oil-induced diarrhea mouse model.

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Poster Presentation ID: 1226

Effects of the *Pistacia atlantica* subsp. *kurdica* Oleoresin on the Symptoms and Quality of Life in Functional Dyspepsia: A Randomized Controlled Trial

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ARTICLE INFO

Keywords:

Pistacia atlantica
Functional dyspepsia
Persian Medicine
Traditional medicine

ABSTRACT

The *Pistacia atlantica* subsp. *kurdica* oleoresin (OPA) is utilized for the treatment of dyspepsia and other gastrointestinal diseases in the Persian Medicine. Therefore, the therapeutic efficacy and safety of standardized OPA in functional dyspepsia (FD) were evaluated. To standardize OPA, the constituents of the OPA essential oil were determined by gas chromatography-mass spectrometry. Fifty patients were allocated to each of the OPA and placebo groups. The OPA and placebo groups consumed two 200 mg OPA or placebo capsules, respectively, every 12 hours along with one 40 mg famotidine tablet per day for 8 weeks. Dyspepsia severity was the primary outcome measured by the Hong Kong dyspepsia index. The secondary outcomes included quality of life measured by the sf-36 questionnaire, complete blood count, and the blood levels of alanine aminotransferase, aspartate aminotransferase, blood urea nitrogen, creatinine, triglyceride, total cholesterol, LDL-C, and HDL-C. The outcomes were measured at the baseline and endpoint. OPA contained 10% w/w essential oil, and the constituents of the OPA essential oil were α -pinene (96%), β -pinene (2%) and terpinolene (2%). Thirty five patients in each group completed the trial. OPA decreased the Hong Kong score significantly ($p = 0.013$), but the placebo had no significant effect on the Hong Kong score ($p = 0.651$), at the endpoint compared to baseline. The sf-36 questionnaire score of the OPA group increased significantly ($p = 0.027$), but it increased insignificantly in the placebo group ($p = 0.078$), at the endpoint compared to baseline. There was no significant effect on the blood tests, and also no side effect. Thus, OPA may mitigate the symptoms, and increase the quality of life of the FD patients without side effects. The OPA essential oil and the monoterpenes α -pinene, β -pinene and terpinolene may be responsible for the effects of OPA in FD.

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Poster Presentation ID: 1227

Biotechnological strategies for alkaloid enhancement in *Catharanthus roseus*: role of *Piriformospora indica* elicitation and tryptophan feeding

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ARTICLE INFO	ABSTRACT
Keywords: <i>Catharanthus roseus</i> Vincristine Alkaloid biosynthesis HPLC Elicitation	<i>Catharanthus roseus</i> is a perennial flowering plant species in the family <i>Apocynaceae</i>, commonly known as Madagascar periwinkle. Native to Madagascar, it is widely cultivated as an ornamental species in tropical and subtropical regions [1]. Beyond its decorative appeal, <i>C. roseus</i> is a valuable medicinal plant that produces over 130 terpenoid indole alkaloids (TIAs), including the well-known compounds vincristine and vinblastine [2]. These alkaloids, mainly synthesized in the plant's aerial parts, are widely used to treat various human cancers [2]. Given the complex and highly regulated biosynthesis pathway of TIAs, biotic elicitors such as the beneficial fungus <i>Piriformospora indica</i> have emerged as a promising strategy to enhance the production of these high-value metabolites [3]. This study investigates the effects of <i>P. indica</i> extract treatment and tryptophan precursor feeding on TIAs production in <i>C. roseus</i> suspension cultures. We treated cell suspensions with different concentrations of <i>P. indica</i> extract (0%, 2%, 4%, and 6% v/v) for 48 and 72 hours and analyzed alkaloid levels. The highest accumulations of catharanthine (1.73 µg/g at 6% v/v), vindoline (18.53 µg/g at 4% v/v), vinblastine (0.31 µg/g at 6% v/v), and vincristine (634.7 µg/g at 2% v/v) were observed at 48 hours. These findings indicate that <i>P. indica</i> extract treatment, combined with precursor feeding, enhances the biosynthesis of pharmacologically valuable alkaloids in <i>C. roseus</i> suspension cultures, offering a sustainable biotechnological approach for alkaloid production.

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Poster Presentation ID: 1228

The effect of feeding with phenylalanine precursor, putrescine, nano silicon dioxide (SiO₂) stimulant on growth and biochemical properties of transgenic hairy roots of reticulated buckwheat (*Hyoscyamus reticulatus* L.)

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ARTICLE INFO

Keywords:

Herbal Medicines

Precursors

Stimulants

ABSTRACT

The production of natural metabolites on a commercial scale in plants is low and to increase their production, it is necessary to use modern technologies [1, 2, 3]. In the present study, the effect of various concentrations of silicon dioxide nanoparticles (SiO₂ NPs) stimulator (zero, 100 and 200 mg/L) and precursors (no precursor, phenylalanine and putrescine (3 mM)) on the growth and phytochemical characteristics of *Hyoscyamus reticulatus* hairy roots were studied. The highest amount of fresh weight (FW) (3.57 g) was observed in the treatment with putrescine precursor and the highest amount of dry weight (DW) (0.73 g) was recorded in the control. The highest amount of total phenol content (TPC) (7.79 mg GA/g FW) and total flavonoid content (TFC) (1.79 mg of quercetin g FW) were obtained in hairy roots treated with putrescine precursor and phenylalanine without elicitor, respectively. HPLC results showed that the highest amount of hyoscyamine (16.4 µg/g DW) and scopolamine (91.3 µg/g DW) was obtained in the hairy roots treated with 200 mg/L SiO₂ NPs and putrescine precursor. Based on the obtained results, the use of combined stimulant and precursor feeding in the culture of transgenic hairy roots of the *H. reticulatus* can be an effective method in improving the production of tropane alkaloids such as hyoscyamine and scopolamine.

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Computational Insights and Predictive Modeling of Metabolic Pathways for Thymol and Carvacrol Production: A Computational Approach to Medicinal Plant Metabolism

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ARTICLE INFO	ABSTRACT
Keywords: Transition States Computational Chemistry Metabolic pathways Biosynthesis	Despite progress in plant biochemistry, the biosynthesis of secondary metabolites remains poorly understood due to metabolic complexity. This study investigates the biosynthetic pathways, activation energies, transition states, and thermodynamic properties of thymol and carvacrol using density functional theory (DFT). Quantum mechanical calculations were performed on thymol, carvacrol, p-cymene, and intermediates using DFT (B3LYP/6-311+G(d)). Geometry optimizations and frequency analyses were conducted without symmetry constraints to determine activation energies, transition states, HOMO–LUMO gaps, and thermodynamic parameters. The impact of the P450 enzyme and hydroxyl radicals on the formation of epoxy groups was also assessed. Among 20 pathways and 24 transition states analyzed, pathway 12 showed the lowest energy barrier (4.7 kcal/mol), while pathway 11 had the highest (50.2 kcal/mol). From a thermodynamic stability perspective, compounds 4C and 4B emerged as the most stable (-32.3 kcal/mol) and least stable (-28.7 kcal/mol) intermediates, respectively. Further analysis of tautomerization in four additional pathways (pathways 17 to 20) identified pathway 18 as the most stable tautomeric form with an energy level of 9.85 kcal/mol. These findings elucidate energy levels, transition states, and stability across various pathways, offering valuable insights into the metabolic processes of medicinal plants. This research presents an innovative computational approach to understanding these pathways, laying a foundation for further studies and applications in pharmaceutical development and agricultural biotechnology.

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Poster Presentation ID: 1230

Silymarin Protected from Doxorubicin-reduced Carbon Clearance in Mice

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ARTICLE INFO	ABSTRACT
Keywords: Doxorubicin Immunotoxicity Protective effects Silymarin	Doxorubicin (DOX) is used in the treatment of various cancers worldwide. Despite of its potent anticancer effects, there are some toxicities including cardiotoxicity, hepatotoxicity and immunotoxicity, which hinders its medical use (1). This study was performed to highlight the possible immunomodulatory effects of Silymarin (SMN) on the doxorubicin-induced immune system toxicity. A total number of 48 male mice were divided into 6 groups (n=8): control, Silymarin 100 mg/kg, Doxorubicin (2 mg/kg), DOX+SMN 50, DOX+SMN 100 and DOX+SMN 150 (50, 100 and 150 mg/kg). The mice were treated for 28 days. On the 29 th day of treatment, mice were euthanized and the blood and tissue samples were subjected to further measurements. The number of white blood cells in blood samples was measured. Carbon Clearance assay as the immunologic biomarkers was carried out before euthanasia (2). Moreover, the total antioxidant capacity was measured in serum samples. Silymarin increased the doxorubicin-reduced number of white blood cells. Exposure to doxorubicin significantly reduced the total antioxidant capacity, which treatment with SMN protected from DOX-induced ATC reduction significantly ($p < 0.05$). A significant increase ($p < 0.05$) in carbon clearance levels as phagocytosis index was observed in the SMN-treated groups compared to the DOX group. Results of the current study show that silymarin can act as a new protective agent in reducing the immunotoxicity and oxidative stress caused by doxorubicin.

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Poster Presentation ID: 1232

Assessing Morphological and Yield Variability Among Iranian Black Cumin (*Nigella sativa* L.) Genotypes in a Controlled Environment

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ARTICLE INFO

Keywords:

Agronomic traits

Black cumin

Morphological diversity

Seedling emergence

ABSTRACT

Nowadays, black cumin seed is essential worldwide due to its significance in health, pharmaceuticals, culinary uses, and as a source of income [1]. It is one of the most significant medicinal plants, cultivated for its essential oils and various other compounds extracted from its seeds. The essential oil content in the seeds ranges from 1% to 1.5% [2]. To evaluate the morphological characteristics of eleven black cumin genotypes, a pot experiment was conducted using a completely randomized design with three replications in the greenhouse of the Faculty of Agriculture and Natural Resources at Razi University. The genotypes included Hamedan, Qazvin, Bu-Ali Sina Botanical Garden, Lordegan, Ardabil, Kermanshah, Sarbisheh, Shahreza, Meybod, Arak, and Semirom. Analysis of variance revealed significant differences among genotypes at $p \leq 0.01$ for weight of grains per plant and biological yield, while plant height and days to seedling emergence showed significant variation at $p \leq 0.05$. The highest weight of grains per plant was observed in Ardabil and Arak genotypes, whereas Sarbisheh showed the lowest yield (0.35 g/plant), with no significant difference from Kermanshah, Lordegan, Qazvin, and Hamedan genotypes. For biological yield, Ardabil and Bu-Ali Sina Botanical Garden genotypes exhibited the highest performance, while Kermanshah, Sarbisheh, Shahreza, and Hamedan showed the lowest values, being statistically similar to Meybod and Lordegan. The tallest plants (42.50 cm) were recorded in Ardabil, showing no significant difference with Bu-Ali Sina, Qazvin, and Arak. In contrast, Kermanshah and Hamedan produced the shortest plants, being statistically similar to Sarbisheh, Shahreza, Meybod, Arak, Semirom, and Lordegan. Regarding seedling emergence time, Hamedan required the most days (11.33 days), being similar to Bu-Ali Sina, Shahreza, Meybod, and Arak, while Semirom emerged fastest (8.50 days), showing no significant difference from Lordegan, Ardabil, Sarbisheh, Kermanshah, and Qazvin. This study demonstrated considerable morphological diversity among the evaluated black cumin genotypes. The findings suggest that selecting genotypes based on morphological traits could be effective in breeding programs and cultivation practices to improve the yield and adaptability of black cumin.

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Poster Presentation ID: 1233

Drought Stress Alleviation in Savory (*Satureja hortensis* L.) through Potassium Nitrate Seed Priming

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ARTICLE INFO

Keywords:

Germination
Drought stress
Savory
Seed priming

ABSTRACT

Seed germination represents a critical phase in plant ontogeny, with drought tolerance during this stage being a decisive factor for the successful establishment of medicinal plants [1]. Seed priming has emerged as a robust pre-germination strategy to augment seed vigor, improve germination efficiency, and enhance seedling development under abiotic stress, including drought conditions. Osmo-priming induces significant cellular, subcellular, and molecular changes that enhance germination performance and promote early seedling growth in various plants [2]. In this study, we evaluated the efficacy of potassium nitrate (KNO_3) priming on germination and seedling parameters in savory (*Satureja hortensis* L.) under drought stress. A factorial experiment employing a randomized completely design with three replicates was conducted, incorporating four priming concentrations (0 [control], 0.5%, 1%, and 1.5% KNO_3) and two drought stress levels (0 [control] and -0.4 MPa, imposed by polyethylene glycol [PEG-6000]). Our results indicate that KNO_3 priming significantly ameliorated germination and seedling performance under drought stress. The 1.5% KNO_3 treatment under non-stress conditions yielded maximal values for germination percentage (88.66%), germination rate (16.25 seeds.d⁻¹), seedling length (9.06cm), and vigor index (8.04). In contrast, the unprimed control under -0.4 MPa stress exhibited the lowest metrics across all parameters (germination percentage: 48 %; germination rate: 8.50 seeds.d⁻¹; seedling length: 6.76 cm; vigor index: 3.25). These findings demonstrate that KNO_3 priming, particularly at 1.5%, mitigates drought-induced germination inhibition in Savory, underscoring its potential as a scalable pretreatment to bolster resilience in medicinal crops cultivated under osmotic stress.

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Poster Presentation ID: 1235

Isolation and Anti-Influenza Evaluation of Terpenoid Derivatives from *Ferula gummosa* Boiss. Root

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ARTICLE INFO

Keywords:

Antiviral activity
Ferula gummosa
Influenza A virus
MDCK
Sesquiterpene coumarin

ABSTRACT

Influenza infection is a serious disease affecting human health worldwide. Due to its antigenic drifts and shifts, the effect of current drugs has been restricted (1). Herbal compounds have been considered successfully in the treatment of influenza infection. *Ferula gummosa* Boiss., is a perennial plant from the family Apiaceae distributed in central Asia, Iran and Afghanistan (2). The aromatic oleogamma-resin obtained by incision of the roots of this plant is known as "Barijeh" and used traditionally as an antispasmodic, antifatulent and expectorant. In the present study phytochemical constituents of dichloromethane (DCM) extract of *F. gummosa* roots were isolated and their antiviral potential was assessed against influenza A virus/H1N1. Phytochemical analysis of DCM extract using normal and reversed phase chromatography columns resulted in isolation of 13 sesquiterpene coumarin derivatives, namely conferol acetate, conferon, badrakemone, mogoltacin, gummosin, feselol, acetyl samarcandin, kellerin, feterin, galbanin A, ferrocaulidin, together with galbanin A and galbanin B as two new compounds. The chemical structure of the isolated compounds was identified using 1D-NMR, 2D-NMR and Mass spectral analyses. Cytotoxic concentration 50% (CC₅₀) and non-toxic concentration (NCTC) of the compounds were determined using MTT method. They were tested in different combination treatments with influenza A virus. The virus titer and cell viabilities were determined using hemagglutination (HA) and MTT assays, respectively (3). The results showed that HA titer decreased between 0-3 logs in all simultaneous, pre- and post-penetration combination treatments. Gummosin, Feselol and Conferol acetate had the greatest effect on reducing HA titer. Cell viability was favorable in all combination treatments. Conferol acetate, Feselol, and Kellerin had the most cell protection ability. The results of this study highlighted Feselol and Conferol acetate as the most effective antiviral compounds. *Ferula gummosa* as a plant rich in antiviral compounds could be considered as an appropriate candidate for design and development of new antiviral drugs.

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Poster Presentation ID: 1237

Investigating the diversity of quantitative morphological traits of *Berberis integerrima* Bunge in Semnan province

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ARTICLE INFO

Keywords:

Medicinal Plants
Morphology
Analysis of Variance
Genotype
Thorn Length

ABSTRACT

Berberis integerrima Bunge is one of the important plants in the country, which has considerable diversity due to the presence of wild populations throughout the country [1]. Due to the great hybridization rate on the genus *Berberis*, considerable morphological diversity was reported in the genus *Berberis* [2]. Alborz mountains is one of the distribution centers of the genus and *Berberis integerrima* Bunge is one of the known species in this region. Thus it is necessary to carry out research related to the diversity of the species. For Supplementary Studies, 5 populations were collected from different regions of Semnan province, and after measuring 14 quantitative and 3 relative traits, including leaves, fruits, thorns, flowers, etc., the collected genotypes were analyzed using SPSS software and one-way analysis of variance (ANOVA) were performed. The results showed that there was a significant difference between the traits of leaf length, the number of pods per cluster, the number of leaves per node and the height of the shrub at the 0.05 level in the investigated populations. The highest average leaf length (2.69 cm), inflorescence length (2.72 cm), number of grains per cluster (15 grains), petiole length (0.65 cm) in Shahroud (Majn) genotype and the highest average length Thorn (1.64 cm), fruit length (0.91 cm), shrub length (311 cm) were related to Shahmirzad genotype. Also, the lowest average leaf length (2.11 cm), thorn length (1.53 cm), inflorescence length (2.17 cm), number of grains per cluster (10 grains) related to Shahrood genotype (Abar village) was observed. The significance of the mean morphological traits can indicate the existence of inter-specific variations in the studied species and therefore these traits can be used for the classification of the *Berberis* genus and also for the purposes of improving genotypes.

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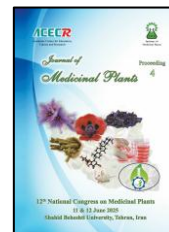
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Poster Presentation ID: 1239

A survey of the awareness and use of medicinal plants in Boyer-Ahmad County, with a focus on university community

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ARTICLE INFO

Keywords:

Herbal medicine
Chemical drugs
Questionnaire
Awareness

ABSTRACT

Herbal medicine, one of the oldest known therapeutic methods, has always held a special place in human history. With growing public awareness of the side effects of chemical drugs and a desire to utilize natural materials, the demand for herbal products has surged in recent decades. This underscores the necessity to explore and comprehend the awareness and utilization of medicinal plants across various communities. The current study investigates this matter in Boyer-Ahmad County, concentrating on the university community in 2023. A standard questionnaire was developed and distributed to the statistical population after assessing its content validity and reliability through the Cronbach's alpha method. The collected data were analyzed using SPSS29 software, employing both descriptive and inferential tests. The results showed that women and employees use medicinal plants more than other groups studied due to their higher level of awareness. The majority of people in the studied community have experienced the use of medicinal plants at some time or repeatedly, which indicates a relatively high acceptance of this treatment method. From the point of view of women, medicinal plants have a faster effect in the treatment of diseases compared to other drugs. In the field of using herbal medicines for prevention and treatment, the findings show that there is a different level of belief between different groups (students, housewives, students and employees). Compared to other groups, housewives believe more in the effectiveness of medicinal plants in preventing and treating diseases. Also, the results showed that the prescription of herbal medicines by local doctors, doctors and other specialists has a significant effect on people's motivation to use medicinal plants and avoid chemical drugs. It seems that it is possible to increase public awareness about the properties and proper use of medicinal plants by providing correct education based on scientific evidence to prevent possible abuse and side effects.

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Poster Presentation ID: 1240

Mitigating Alkaline Stress in *Vigna mungo* L. via Selenium Seed Priming: A Physiological Approach

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ARTICLE INFO	ABSTRACT
Keywords: <i>Vigna mungo</i> L. EC SeO₂ Hydropriming	Seed priming, including hydropriming (water priming, WP), is among the most effective strategies to accelerate seed germination, enhance grain yield, optimize plant growth, and reduce physiological heterogeneity under stress conditions (1). Selenium (Se) is also a vital microelement, playing a significant role in various physiological processes and contributing to improved product quality and nutritional value when applied in small amounts (3). Black gram (<i>Vigna mungo</i> L.) is a nutritionally valuable legume that also plays a key role in biological nitrogen fixation, thereby enhancing soil fertility (2). In this study, black gram seeds were primed for 6 hours in either distilled water (control) or 100 μM SeO₂ solution. Two weeks after germination, all seedlings (excluding the control group) were subjected to alkaline stress (pH = 9) for 14 days. The results showed that alkaline stress significantly reduced shoot length and increased electrolyte leakage (EC) compared to the control group. However, SeO₂ priming improved stress resistance, enhancing plant tolerance to alkaline conditions in black gram.

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Feasibility study of secondary compounds production in hairy roots of *Melissa officinalis*

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ARTICLE INFO	ABSTRACT
Keywords: <i>Agrobacterium rhizogenes</i> Hairy root Secondary metabolites	Hairy roots are valuable systems for the production of pharmaceutical and agricultural secondary metabolites. In this study, we aimed to induce hairy roots in <i>Melissa officinalis</i> using various techniques, including mechanical wounding, co-cultivation, sonication, and vacuum infiltration. Among these methods, wounding and vacuum infiltration proved the most efficient for hairy root induction. Different <i>Agrobacterium rhizogenes</i> strains (A4, ATCC15834, R1000, and MUS) were evaluated, with strains A4 and R1000 showing the highest induction efficiency in <i>M. officinalis</i> . These findings highlight the critical role of strain selection in optimizing hairy root production. Overall, the successful establishment of hairy root cultures can facilitate the large-scale production of valuable secondary metabolites, offering a sustainable source of raw materials for pharmaceutical industries. This study underscores the potential of plant biotechnology to enhance both the yield and quality of bioactive compounds, providing innovative solutions for the pharmaceutical and agricultural sectors.

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Poster Presentation ID: 1243

From Herb to Headache Relief: A Network-Based Study on *Origanum Vulgare* L.

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ARTICLE INFO

Keywords:

Migraine

Origanum vulgare L.

Molecular docking

Network pharmacology

Multi-target therapy

ABSTRACT

Migraine is a complex neurological disorder characterized by recurrent headaches and associated symptoms influenced by genetic, hormonal, vascular, and neuroinflammatory factors. Key proteins such as NOS3, DRD2, ESR1, HTR2A, CACNA1A, TRPV1, and CALCA regulate vascular tone, neurotransmission, hormonal balance, and pain signalling. *Origanum vulgare* L. (oregano), a traditional medicinal herb with anti-inflammatory, analgesic, and neuroprotective properties, has shown potential in neurological applications (1). Yet, its molecular mechanism of action in migraine remains poorly understood. This study aimed to investigate the therapeutic potential of oregano-derived bioactive compounds against migraine through an integrative in silico approach combining network pharmacology and molecular docking (2). The objectives were to identify migraine-related targets, predict compound-target interactions, and elucidate potential multi-target mechanisms. Phytochemical data for oregano compounds were collected from PubChem, while migraine-associated protein targets were sourced from UniProt and DisGeNET. Compound-target predictions were performed using BindingDB, SwissTargetPrediction, SEA, and TargetNet. Gene-gene and protein-protein interaction networks were constructed using GeneMANIA and STRING to explore functional clustering among targets. Molecular docking was conducted via AutoDock Vina to evaluate binding affinities between oregano compounds and the selected proteins. The results identified luteolin, apigenin, and rosmarinic acid as top-performing compounds, showing strong and consistent binding affinities across multiple targets. These compounds were particularly effective in modulating nitric oxide pathways and dopaminergic and serotonergic signalling systems central to migraine pathophysiology. Network analyses further emphasized key target hubs involved in neurovascular and hormonal regulation. This study provides computational evidence supporting *O. vulgare* as a promising multi-target candidate for complementary migraine therapy. The findings offer mechanistic insights into its pharmacological effects and establish a foundation for further experimental validation and potential development of oregano-based therapeutic strategies.

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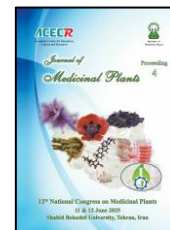
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Poster Presentation ID: 1244

Formulation, standardization, and evaluation of the anti-colitis activity of Qurs-e Gol, a Persian polyherbal formulation in acetic acid-induced colitis in rats

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ARTICLE INFO

Keywords:

Ulcerative colitis

Inflammation

Traditional persian
medicine

Rosa damascena Mill.

ABSTRACT

Inflammatory bowel disease (IBD) is a long-term disease with increasing global incidence, especially in children. In addition to the economic and social costs imposed by this disease, the progression of the disease over time can also increase the risk of developing colon cancer. Recent studies have shown the positive effects of natural products, especially herbal medicines, in controlling the signs and symptoms of IBD (1). This study explored the anticolitic effects of Qurs-e Gol, a traditional Persian polyherbal formulation, in male Wistar rats suffering from colitis induced by acetic acid. *Rosa damascena* Mill. (Damask rose), *Rumex conglomeratus* Murray (clustered dock), starch, *Senegalia senegal* (L.) Britton gum (gum Arabic), and *Astragalus* L. subgen. *Tragacantha* gum (gum Tragacanth) was separately ground, sifted, and then mixed with suitable excipients to formulate Qurs-e Gol tablets. To trigger colitis, researchers have administered 4% acetic acid intrarectally. The 14-day experiment involved six groups of rats, including a sham group that received normal saline; a second group that received normal saline postinduction; a third group that received dexamethasone postinduction; and three treatment groups that received Qurs-e Gol at doses of 200, 400 and 800 mg/kg for 14 days. Macroscopic evaluation revealed that, compared with the control, Qurs-e Gol at doses of 400 and 800 mg/kg significantly reduced inflammation and ulcers ($P < 0.001$), with effects similar to those of dexamethasone. Microscopic examination of colon tissue confirmed these results, revealing a decrease in lesion depth with the 400 and 800 mg/kg doses ($P < 0.001$). The most significant reduction in serum tumor necrosis factor (TNF- α) levels was noted at 800 mg/kg ($P < 0.001$), although the 200 and 400 mg/kg doses were also effective ($P < 0.01$). This study highlights the effectiveness of Qurs-e Gol, a traditional Persian polyherbal remedy, in easing colitis symptoms in rats, resulting in impressive anti-inflammatory effects (2). When administered at doses of 400 mg/kg and 800 mg/kg, there was a notable decrease in inflammation, ulcers, and lesion depth, with results that rival those of dexamethasone. Moreover, the most significant decrease in the serum TNF- α concentration occurred at the highest dosage. These results indicate that Qurs-e Gol might be a promising natural option for treating ulcerative colitis, and further research in both animal and human trials is needed to fully explore its therapeutic potential.

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Poster Presentation ID: 1246

Zein Recovery from Corn Gluten by Alcoholic Extraction

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ARTICLE INFO

Keywords:

Zein

Prolamine

Alcoholic Extraction

ABSTRACT

Zein is a prominent member of the prolamine group, a class of proteins commonly found in cereal gluten. Prolamines uniquely produce exclusively amino acids upon hydrolysis, distinguishing them from other protein groups. Zein possesses significant economic, industrial, and practical value, particularly due to its versatile applications in pharmaceuticals, food industries, and agriculture. Notably, zein is utilized as a coating material for pharmaceutical tablets, contributing to controlled drug release and enhanced product stability. In the food industry, zein coatings are employed to extend shelf life, preserve freshness, and improve texture by creating effective moisture barriers. Moreover, agricultural uses include protecting fruit trees and produce from premature spoilage and environmental stressors, preventing souring and staleness. In this research, zein extraction from corn gluten was systematically investigated through solvent-based methods, emphasizing the use of alcohol as a primary solvent. Comparative analyses with other cereal sources such as wheat demonstrated that corn gluten possesses a significantly higher zein concentration, facilitating more efficient extraction processes. Rigorous experimental protocols evaluated various extraction parameters, leading to optimized conditions characterized by solvent composition, temperature, and duration of extraction. Under the optimal conditions determined through extensive experimentation, a remarkable extraction efficiency of approximately 28% was achieved. Purity verification, conducted via the Kjeldahl method, indicated high-quality zein comparable to commercial-grade zein imported from Fluka (Switzerland), which served as the benchmark standard. Among tested solvents, 85% isopropanol alcohol emerged as superior, with a solvent content six times that of gluten. This research highlights the substantial benefits of using optimized solvent extraction techniques for zein, underscoring the practicality of corn gluten as a preferred source. The outcomes provide valuable insights and methodological improvements beneficial for industries reliant on zein, supporting the sustainable utilization of corn-based agricultural resources.

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Poster Presentation ID: 1248

Formulation and Nutritional Evaluation of a Low-Caffeine Herbal-Fruit Tea Based on Fennel Extract

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ARTICLE INFO	ABSTRACT
Keywords: Herbal tea Fennel extract Functional beverage Fruit concentrate Caffeine Vitamin C	Herbal teas are among the oldest traditional beverages, known for their rich aromas, diverse flavors, and health-promoting properties derived from bioactive compounds extracted through hot water infusion. Over time, traditional teas have been enhanced with innovative ingredients, including the addition of natural fruit concentrates, to meet the growing demand for healthier alternatives to carbonated and processed beverages. Such developments are particularly appealing to consumers seeking healthy and low-caffeine options. Fennel (<i>Foeniculum vulgare</i> Mill.), a widely cultivated member of the Apiaceae family, has long been used both as a culinary spice and as a therapeutic agent, particularly for gastrointestinal, reproductive, and respiratory disorders. This study aimed to develop and characterize a herbal fruit tea based on fennel seed extract. Fennel seeds were extracted using hot water in a Brewer device at 60°C for 5 hours. The extract was then formulated with apple concentrate and additives, followed by pasteurization. Physicochemical and nutritional analyses were performed: sodium and potassium levels were measured by atomic absorption spectroscopy, while vitamin C and caffeine contents were determined by titration and spectrophotometry, respectively. The results showed that the herbal tea contained 65 ppm of sodium and 613 ppm of potassium. The vitamin C content was measured at 2.08 mg/100 mL, and the caffeine concentration was relatively low at 26.83 ppm. This formulated beverage is characterized by high potassium content and moderate levels of vitamin C, offering potential benefits for overall health. Its low caffeine content makes it a promising alternative for individuals who are sensitive to caffeine or seeking healthier beverage options. Combining fennel extract with natural fruit concentrates represents a viable strategy for developing functional beverages with enhanced nutritional profiles and strong consumer appeal.

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Poster Presentation ID: 1249

In silico evaluation of the potential side effects of strong tyrosinase inhibitors on grape polyphenol oxidase

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ARTICLE INFO

Keywords:

In silico screening
Molecular docking
Tyrosinase inhibitors
Virtual screening

ABSTRACT

In the three-dimensional structure of enzymes, spaces known as cavities are present, which can act as nonspecific binding sites and positively or negatively influence the enzyme's function. Tyrosinase, a polyphenol oxidase and one of the key enzymes involved in the browning phenomenon of agricultural products, is an example of this. This enzyme shows enhanced activity at low concentrations of its substrate (tyrosine) but becomes inhibited at higher concentrations. Bioinformatics studies have attributed this phenomenon to the binding of excess substrate molecules within the nonspecific cavities. In this study, with the aim of more precisely analyzing the potential involvement of nonspecific binding sites, six strong inhibitors with competitive, non-competitive, and mixed inhibition mechanisms were collected from the ChemSpider database and analyzed. The three-dimensional structure of tyrosinase extracted from grape (*Vitis vinifera* L. cv. Grenache) was obtained from the RCSB PDB database, and molecular docking was performed using Molegro Virtual Docker (MVD) software. To investigate the interactions in greater detail, UCSF Chimera was employed, and GROMACS was used to simulate the stability of the complexes under near-real conditions. During the simulation and molecular visualization processes, PyMOL software was additionally employed for more detailed analysis of the molecular structures. Studies on the potential interactions between inhibitors and nonspecific binding sites demonstrated favorable interactions with these sites. Such interactions may explain the dual behavior of the enzyme depending on the inhibitor concentration. Therefore, the optimal selection of inhibitor concentrations to achieve the best outcome requires precise knowledge of the structural characteristics of the enzyme and its binding sites. The results of this research can serve as a foundation for the more targeted design of inhibitory compounds to control enzymatic browning in agricultural products and contribute to the development of effective strategies for improving postharvest technologies.

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Poster Presentation ID: 1250

Antioxidant and Phytochemical Analysis of *Cistanche tubulosa* and *C. deserticola*: A Comparative Study in Yazd, Iran, and Xinjiang, China

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ARTICLE INFO

Keywords:

Cistanche
Desert ecosystems
Halophytic hosts
ABTS assay
Traditional Medicine

ABSTRACT

The genus *Cistanche* (Orobanchaceae) is predominantly found in arid and semi-arid regions, particularly within the desert landscapes of the Central Plateau of Iran and northwestern China. In Iran, Yazd Province, characterized by saline soils with medium to heavy texture, serves as a primary habitat for *Cistanche tubulosa*, particularly in areas where *Haloxylon* is cultivated to combat desertification and stabilize sandy soils. In China, the Taklimakan Desert in Xinjiang represents a critical habitat for both *C. tubulosa* and *C. deserticola*, the latter of which is a principal source of the Traditional Chinese Medicine "Roucongrong". These species are known to parasitize *Tamarix* and *Haloxylon ammodendron*, respectively. This study evaluates the antioxidant diversity and phytochemical content of *C. tubulosa* associated with *Haloxylon* hosts in Yazd, Iran (30°29'41.5"N, 54°12'21.5"E), in comparison to *C. tubulosa* and *C. deserticola* from Xinjiang, China (sourced from a Beijing medicinal herb store), which are primarily cultivated for pharmaceutical purposes. Stem samples were collected and authenticated with herbarium codes, and extraction was performed using a Percolation apparatus with a hydroethanolic solvent (70:30). A factorial experiment was designed in a completely randomized manner with three replicates to assess six traits: total antioxidant capacity (TAC), free radical scavenging activity (DPPH and ABTS assays), ferric reducing antioxidant power (FRAP), total phenolic content (TPC), and total flavonoid content (TFC). Mean comparisons indicated that the Chinese *C. tubulosa* ecotype exhibited the highest TAC (76.17±0.32unit/mL), ABTS inhibition (93.09±0.29%), DPPH inhibition (78.21±0.90%), and FRAP (1.66±0.02 mmoleFe^{II}) (P -value≤0.01). Similarly, the highest TPC (225.06±1.06 mgGAE/100g) and TFC (1528.45±4.63 µgQE/g) values were recorded for this ecotype. While no significant differences were observed between the Iranian *C. tubulosa* and Chinese *C. deserticola* regarding these traits (P -value>0.05), they ranked second and third, respectively. The distribution of these species in desert regions and their dependence on halophytic hosts underscore the ecological and pharmaceutical significance of *Cistanche* within arid ecosystems.

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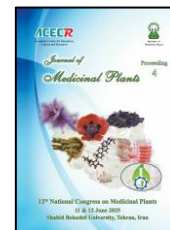
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Poster Presentation ID: 1251

Exploring the Impact of Plant Growth-Promoting Rhizobacteria (PGPR) on Changes in Essential Oil Composition of *Lippia citriodora* under Urban Wastewater Conditions

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ARTICLE INFO	ABSTRACT
Keywords: Essential oil Irrigation PGPR <i>Lippia citriodora</i> Wastewater	Environmental factors and biological regulators play a role in affecting the mechanisms within plants that generate secondary metabolites[1]. This study was carried out through a pot experiment in the greenhouse. The study utilized a factorial-based randomized complete block design with four repetitions, on the University of Kashan in 2024. The focus was on examining the growth and yield of <i>Lippia citriodora</i> when coexisting with plant growth-promoting rhizobacteria under conditions using purified urban wastewater. The treatments involved PGPR with two inoculation levels both inoculated and non-inoculated and urban wastewater treatment at five gradations: control (0%, 25%, 50%, 75%, and 100% wastewater). Various characteristics were assessed, including plant height, number of stems per plant, stem length, leaf count, leaf area, collar diameter, fresh and dry shoot weight, essential oil percentage, and essential oil yield. The findings indicated that increasing the proportion of wastewater in irrigation water led to a decline in the growth and yield of <i>Lippia citriodora</i>. However, when plants were inoculated with PGPR, growth improved under irrigation with treated wastewater, enhancing overall plant performance in these conditions. The maximum fresh and dry weight of shoots was observed in inoculated plants under controlled irrigation, whereas the lowest values were seen in non-inoculated plants receiving 100% wastewater treatment. These traits decreased by 53.44% and 35.31%, respectively, compared to plants inoculated with bacteria without the use of treated wastewater. Additionally, the highest percentage of essential oil from <i>Lippia citriodora</i> was achieved in plants inoculated with bacteria and irrigated with 50% wastewater. The essential oil content reduced with bacterial inoculation, while control treatment plants yielded the highest essential oil content [2]. Utilizing advantageous soil microorganisms, like growth-promoting bacteria, plays a crucial role in enhancing plant growth, particularly under environmental stresses such as heavy metal exposure and irrigation with treated wastewater [3].

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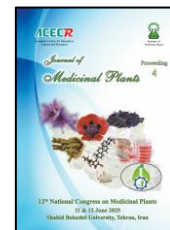
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Poster Presentation ID: 1252

The study of the bioaccumulation of chromium in the blue-green algae *Arthrospira plantensis* and its therapeutic properties

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ARTICLE INFO

Keywords:

Algae

Arthrospira

Chromium

Diabetes

Biotechnology

ABSTRACT

With the increase in life expectancy and the aging population, non-communicable diseases and micronutrient deficiencies have emerged as global health challenges. Micronutrient deficiencies can lead to metabolic disorders and a reduced immune response to diseases. Chromium, which is absorbed through the intestine, has a low absorption efficiency (ranging from 0.4% to 2.5%). Organic sources of chromium are better absorbed than mineral forms, and its supplements are recommended for the treatment of type 2 diabetes and the management of metabolic diseases. *Arthrospira*, known as a superfood, contains rich compounds including proteins and minerals, and is recognized as a good source of organic chromium. However, the amount of chromium present in it is not sufficient for diabetes treatment. By enhancing the bioaccumulation of chromium in the cultivation process of *Arthrospira*, this issue can be resolved, and it can be introduced as a suitable source of organic chromium. For this purpose, *Arthrospira platensis* was obtained from the algal collection of the Marine Biology Department at Tarbiat Modares University. Four treatments were selected for cultivation: Treatment 1 (control), Treatment 2 (Fe₂O₃) iron oxide, Treatment 3 (ZnO) zinc oxide, and Treatment 4 (CrO) chromium oxide added to the culture medium. The cultivation was carried out at a temperature of 28 ± 2 degrees Celsius with a light/dark cycle of 15/9 hours for 14 days. After the cultivation was completed, samples were freeze-dried using a freeze dryer, and the amount of chromium in the samples was measured using an atomic absorption device. The results were analyzed using SPSS software version 36. The results of the present study showed that the amount of chromium in the treatments was 6, 4, 24, and 1188 (mg/kg), respectively. Based on the results, the organic chromium present in *Arthrospira* (which received inorganic chromium and transformed it into organic chromium for storage) can be a suitable natural source for treating individuals with type 2 diabetes or prediabetes.

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Poster Presentation ID: 1253

Evaluation of the Effectiveness of Essential Oil Derived from *Cupressus arizonica* Cones and Leaves of Medicine-Enrichment of Traditional Maragheh soap

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ARTICLE INFO	ABSTRACT
Keywords: Medicinal soap Arizona cypress Oil efficiency Antimicrobial effect Aroma agent	<i>Cupressus arizonica</i> is one of the aromatic, and aesthetically pleasing trees having several pharmacological uses. This is also known to reduce depression, anxiety and fatigue and widely used in traditional medicine because it has important biological activities related to human health. So, according to the antimicrobial properties of <i>C. arizonica</i> oil this study aimed to determine the extracted essential oil constituents of leaves and cones in order to use in medicinal soap production at university of Maragheh. For this reason, cones and leaves from a single <i>C. arizonica</i> tree grown in University of Maragheh were collected. Results showed that the cones essential oil has a higher extraction yield than leaves; In total, GC-MS analysis revealed 8 and 29 compositions respectively in cones and leaves which is illustrated in Figure 1, suggesting that the essential oils exhibit diversity not only within a variety but also across different parts of the tree. Key compounds such as α-Pinen (44.4%), b-pinen (20.1%), limonene (8.15%), 3-Carene (7.76%), and 4-Carene (5.02%) were the most abundant compounds in the cones whereas the main components in the leaves essential oil were Thujen (8/2%), Murolla (6/2%), α-cedrene (5/26%), and α-Pinen (4.22%). Because to the higher concentration of α-Pinen derived from cones compared to the leaves, cones essential oil of <i>C. arizonica</i> can serve as a good microbial inhibitor as well as aroma agent in production of traditional soap enrichment. In general, this research provides valuable insights into the intricate chemical composition of <i>C. arizonica</i> essential oils with respect to the leaves and cones, paving the way for further exploration and utilization in various applications such as aromatherapy, and cosmetics except for enrichment of traditional Maragheh soap, pharmaceutically.

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Poster Presentation ID: 1254

The effect of soil texture and salinity levels on the effectiveness of wood alcohol on the initial growth of the medicinal plant *Hibiscus sabdariffa*

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ARTICLE INFO

Keywords:

Organic
Acidity
Stress
Physiology
Growth

ABSTRACT

In order to investigate the effect of soil texture and different levels of water salinity on the efficiency and effect of wood alcohol consumption on the initial growth and germination characteristics of *Hibiscus sabdariffa*, this experiment was conducted in the research greenhouse of the Faculty of Agriculture and Natural Resources of Torbat Heydaryeh University in 1403-1404. The experiment was a three-factorial factorial experiment including soil texture in three levels (sand, loam, and clay or heavy) as the first factor, Irrigation water salinity at two levels (2 and 6 dS/m) as the second factor and Wood alcohol consumption was implemented at two levels (no consumption as a control and consumption of wood alcohol) as the third factor in three replications in 15 cm wide pots. The results showed that salinity severely reduced the germination and early growth characteristics of *Hibiscus sabdariffa*. The use of wood alcohol improved germination characteristics other than root characteristics. The best soil for growing sour tea was loam with non-saline water. The number of leaves, fresh and dry weight of shoots, and plant height were the highest in the wood alcohol treatment under non-saline water conditions in loamy soil. In general, the results showed that the use of wood alcohol in saline and heavy soil conditions can prevent the growth of the tea plant from decreasing, and its use is recommended to farmers.

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Poster Presentation ID: 1255

Investigation of Peroxidase Isozyme Production in Cell Cultures of *Onosma dasytrichum* under Nutrient Stress

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ARTICLE INFO

Keywords:

Onosma dasytrichum
Peroxidase
Isoenzyme
Callus culture
Nutrient stress

ABSTRACT

Onosma dasytrichum, an indigenous medicinal species from Iran belonging to the Boraginaceae family, is recognized for its therapeutic potential owing to its rich content of phenolic compounds, antioxidant capacity, and defensive enzymes. Consequently, *in vitro* cell culture studies on this species hold considerable biotechnological significance. In this study, peroxidase isoenzyme expression and enzymatic activity were evaluated under nutrient stress conditions, which are known to impact cell proliferation and secondary metabolite biosynthesis. The previously produced callus of this plant (Bagheri et al., 2011) was transferred onto two basal media, Murashige and Skoog and Gamborg's B5, supplemented with 2,4-dichlorophenoxyacetic acid (2,4-D, 1.0 mg L⁻¹) and kinetin (0.5 mg L⁻¹) to induce nutrient stress. The distinct mineral and organic compositions of the media served as the basis for inducing nutrient stress. After a 21-day incubation period, callus were harvested and peroxidase enzymes were extracted using phosphate-buffered saline. Proteins were precipitated stepwise using ammonium sulfate at 30 and 90% saturation, followed by dialysis and gel filtration chromatography with Sephadex G-50 for purification. Enzymatic activity was assayed spectrophotometrically using phenol (510 nm) and 4-[(4-Hydroxy-3-methoxyphenyl) azo]-benzenesulfonic acid (GASA, 370nm) as substrates (Mohammadnejad et al., 2020). The optimal conditions for peroxidase activity were determined to be pH 6.5 and 40°C. Notably, a statistically significant enhancement in peroxidase activity was observed in callus grown on B5 medium, indicating the activation of antioxidant metabolic pathways in response to nutrient-limited environments.

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Poster Presentation ID: 1256

The Interactive Effect of Wood Alcohol and Superabsorbent Polymer on The Resistance of Purple Basil (*Ocimum basilicum* L) to Drought

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ARTICLE INFO	ABSTRACT
Keywords: Acidity Basil Irrigation deficiency Quality Biomass	<i>Ocimum basilicum</i> is a valuable medicinal plant that is sensitive to water deficit, and water shortage negatively affects sweet basil yield and quality (Beigi et al., 2020). Also different levels of drought stress had significant effect on the number of branches, fresh weight and morphological characteristics (Moghaddam et al., 2015). In order to investigate the interaction effects of wood alcohol and superabsorbent polymers on the drought resistance of the medicinal plant purple basil (<i>Ocimum basilicum</i> L), this experiment was conducted in the research greenhouse of the Faculty of Agriculture and Natural Resources of Torbat Heydariyeh University in 1403-1404. The experiment was a three-factorial factorial experiment, including wood alcohol consumption at two levels (no consumption as a control and wood alcohol consumption) as the first factor, Application of superabsorbent polymer at two levels (non-use as a control and its use) as the second factor and irrigation levels were implemented at three levels (every 2, 4 and 6 days of irrigation) as the third factor in three replications in 15 cm wide pots. The results showed that the use of wood alcohol improved germination characteristics and increased the number of leaves and height of basil plants. Although drought reduced the size (31 %) and number of leaves (24 %), as well as the height of basil plants, the use of superabsorbent polymer reduced the negative effects of drought. The number of leaves (6.7), fresh weight (10.3 g) and dry weight (2.7 g) of shoots, and plant height in the treatment with wood alcohol increased significantly in all three irrigation interval conditions compared to the absence of wood alcohol (27.1, 29.4 and 34 % respectively). Moreover, methanol participates in metabolic biochemical processes during growth and development (Dorokhov et al., 2018). In general, the results showed that the use of wood alcohol and super absorbent polymer increased resistance to drought stress and irrigation deficiency in basil plants and can be recommended to farmers. However, there is a possibility that the use of wood alcohol will reduce the durability of the polymer properties in the soil in the coming years.

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Poster Presentation ID: 1257

Evaluating the Role of *Bacillus subtilis* in Alleviating Salt Stress in *Cichorium intybus*

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ARTICLE INFO

Keywords:

Bacillus subtilis
Cichorium intybus
Medicinal plants
Salt Stress

ABSTRACT

Medicinal plants are particularly vulnerable to drought stress, which significantly affects their growth and the production of essential bioactive compounds. Prolonged water deficits interfere with crucial physiological processes, such as photosynthesis and nutrient uptake, thereby compromising their medicinal properties and challenging sustainable cultivation practices. This study focuses on chicory (*Cichorium intybus*), a species within the Asteraceae family, with origins in western Asia, northern Africa, and central Europe, and historical significance dating back to ancient Egypt. Chicory is characterized by its slender, densely hairy stems and limited branching near its apex. An experiment was conducted under controlled greenhouse conditions using a randomized block design to assess the effects of *Bacillus subtilis* on chicory's salinity tolerance. Fourteen treatments, encompassing seven salinity levels with and without bacterial application, were tested in four replicates. Results revealed that the application of *Bacillus subtilis* significantly improved chicory's tolerance to salinity, achieving a threshold of up to 10 dS. These findings underscore the potential of biological interventions to enhance the sustainable cultivation of medicinal plants in challenging environments, particularly in Iran.

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Poster Presentation ID: 1258

Superior Neuroprotection of Menthol Compared to Curcumin in Cerebral Ischemia: A Stereological Analysis

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ARTICLE INFO

Keywords:

Menthol
Neurodegenerative
disease
Curcumin
Cerebral ischemia

ABSTRACT

Global cerebral ischemia (GCI) is a life-threatening condition often occurring after events such as cardiac arrest[1], leading to memory impairment and neuronal loss. The hippocampus, particularly the CA1 region, is highly vulnerable to ischemic injury. Menthol (ME) and curcumin (CUR) are natural compounds known for their neuroprotective properties, including antioxidant and anti-inflammatory effects [2]. This study aimed to investigate and compare the neuroprotective effects of ME and CUR following GCI. Twenty-five adult male Wistar rats were randomly assigned to five groups: Sham, GCI, GCI+CUR (100 mg/kg), and GCI+ME (100 mg/kg). GCI was induced via bilateral common carotid artery occlusion for 20 minutes, and treatments were administered intragastrically 30 minutes post-ischemia. Stereological analysis was performed to evaluate the total number and density of pyramidal neurons in the hippocampal CA1 region. The results showed that CUR treatment did not significantly improve the total number or density of pyramidal neurons compared to the untreated GCI group. In contrast, ME treatment significantly preserved neuronal integrity in the CA1 region. The superior effect of ME may be attributed to differences in the bioavailability of these compounds. ME demonstrated a stronger neuroprotective effect than curcumin in the hippocampal CA1 region following GCI, likely due to its higher bioavailability. These findings suggest that ME could be a promising therapeutic candidate for mitigating neuronal damage after ischemic events.

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Poster Presentation ID: 1260

Application of QNMR for Simultaneous Quantification of Curcumin in Turmeric Extracts

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ARTICLE INFO	ABSTRACT
Keywords: Curcumin QNMR Turmeric Soxhlet extraction	Curcumin, the main active compound of turmeric (<i>Curcuma longa</i> L.), requires a high-efficiency extraction strategy for its uses in the pharmaceutical and food industries. In this study, curcumin was extracted from turmeric using reflux, maceration, and Soxhlet methods (with ethanol and acetone as solvents) and their efficiency were evaluated by a quantitative Nuclear Magnetic Resonance spectroscopy (QNMR), which offers advantages such as no need for external standards, simultaneous analysis of multiple compounds, and simple sample preparation. Maleic acid was used as the internal standard, and deuterated acetone served as the solvent. Calculations were performed based on the ratio of the peak area of curcumin to the standard. Results demonstrated that the Soxhlet extract with 80% acetone achieved the highest curcumin extraction efficiency (based on dry weight). This study highlights the superiority of QNMR as a rapid and reliable analytical method for standardizing natural compounds.

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Poster Presentation ID: 1261

Evaluating the Role of *Bacillus subtilis* in Alleviating Salt Stress in *Melissa officinalis*

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ARTICLE INFO

Keywords:

Bacillus subtilis

Lemon balm

Medicinal plants

Melissa officinalis

Salt Stress

ABSTRACT

Melissa officinalis, commonly known as lemon balm, is a medicinal plant with valuable aromatic properties. However, its growth is significantly affected by salinity stress. This study aimed to investigate the impact of *Bacillus subtilis* on enhancing the salinity tolerance of Iranian lemon balm. A greenhouse experiment was conducted using a Randomized Block Design with 14 treatments (seven salinity levels: 0, 2, 4, 6, 8, 10, and 12 dS/m) and four replications, involving bacterial inoculation applied individually and synergistically with different salt concentrations. Key measured factors included plant height, chlorophyll content, proline accumulation, total biomass, and antioxidant enzyme activity. The results revealed that the application of *Bacillus subtilis* significantly improved salinity tolerance, especially at 6 dS/m, where treated plants exhibited a 21% increase in biomass and 23% higher chlorophyll content compared to the non-inoculated control group. Furthermore, proline levels increased by 20%, indicating enhanced stress adaptation. These findings highlight the potential of *Bacillus subtilis* as a promising biological treatment for sustainable cultivation of medicinal plants under saline condition.

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Poster Presentation ID: 1262

Identification and Quantification of Bioactive Compounds in the Iranian *Cistanche tubulosa* Extract Using LC-MS/MS

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ARTICLE INFO	ABSTRACT
Keywords: Cistanche Bioactive compounds Rutin Kaempferol Soxhlet extraction	Cistanche, a member of the Orobanchaceae family, is well-regarded for its robust antioxidant properties and therapeutic potential in traditional medicine, particularly in the treatment of various ailments, including renal disorders, sexual dysfunction, and hypertension. Research indicates that the primary active components of Cistanche are phenylethanoid glycosides (PhGs). In this study, the Iranian ecotype <i>C. tubulosa</i> was collected from the desert regions of Yazd province and subsequently extracted using a Soxhlet apparatus. The resulting extract was analyzed for bioactive compounds utilizing LC/MS-MS technology. A total of 13 bioactive compounds were identified through LC/MS-MS analysis. The highest concentration observed was for rutin (977.46 mg/kg), whereas kaempferol exhibited the lowest concentration (43.40 mg/kg). Various quercetin derivatives also demonstrated favorable concentrations, with Quercetin-3-6-O-acetyl-/β-glucopyranoside, isoquercetin, and quercetin quantified at 411.38, 308.84, and 182.25 mg/kg, respectively. Moreover, kaempferol-3-/6-O-acetyl-/β-glucopyranoside (460.20 mg/kg), narcissin (343.35 mg/kg), and dattelic acid (323.90 mg/kg) were present in significant quantities in the extract. Additional compounds such as isorhamnetin-3-O-β-glucoside (152.27 mg/kg), chlorogenic acid (89.43 mg/kg), isorhamnetin-3/6-O-acetyl-β-glucopyranoside (68.00 mg/kg), isorhamnetin (67.08 mg/kg), and astragalin (53.86 mg/kg) were also identified in the extract. These findings contribute to a deeper understanding of the therapeutic properties and potential applications of Cistanche extract, thereby facilitating further investigations into the medicinal effects of this plant.

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Poster Presentation ID: 1263

Harnessing Inorganic Nitrogen Enrichment to Boost Phycocyanin Production in *Arthrospira platensis*

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ARTICLE INFO	ABSTRACT
Keywords: <i>Arthrospira platensis</i> Phycocyanin Inorganic nitrogens Enrichment strategy Economic cultivations	<i>Arthrospira platensis</i>, commonly known as Spirulina, is a cyanobacteria recognized for its high nutritional value and the production of phycocyanin, a natural blue pigment with significant applications in pharmaceuticals, food coloring, and biotechnology due to its antioxidant, anti-inflammatory, anti-anemic, antidiabetic anti obesity and neuroprotective properties. So far, <i>A. platensis</i> has been highly regarded as promising species for its capacity to produce phycocyanin. Maximizing the biomass yield of <i>A. platensis</i> and enhancing phycocyanin accumulation are crucial for economic viability. The growth of <i>A. platensis</i> and the synthesis of phycocyanin can be influenced by various abiotic factors, including light and nutrient availability, particularly nitrogen enrichment or deficiency. However, there is limited research on the impact of nitrogen sources. Supplementing organic nitrogen sources into the culture medium in small, appropriate quantities can enhance microalgal biomass production and biosynthesis of phycocyanin. Yet, little information is available in the literature regarding the effects of inorganic sources on cyanobacterial growth and phycocyanin biosynthesis. This study aimed to optimize the cost-effectiveness of cultivation techniques to enhance cellular biomass and phycocyanin production in <i>A. platensis</i> through metabolic stress induced by various nitrogen sources, both inorganic and organic. The research was conducted using the standard Zarouk medium (Zm) under controlled conditions. Two experimental groups were designed: one with different levels of inorganic nitrogen (sodium nitrate) and the other with organic nitrogen sources (succinic acid and monosodium glutamate). Growth was monitored over 19 days, with measurements of dry cell weight and phycocyanin concentrations taken at regular intervals. Through an innovative optimization of nitrogen levels, the treatment supplemented with a final concentration of 41.2 mM sodium nitrate, achieved the highest dry cell weight (0.926 g L⁻¹) and phycocyanin concentration (0.383 mg mL⁻¹), significantly surpassing both lower and higher nitrogen concentrations as well as organic nitrogen sources. Statistical analysis confirmed the superiority of inorganic nitrogen sources in promoting growth and pigment accumulation. Furthermore, the study introduced an innovative approach by applying periodic shocks of inorganic nitrogen, which demonstrated superior performance compared to continuous exposure, indicating that controlled enrichment can enhance phycocyanin production efficiency. These innovations in nitrogen source selection and enrichment strategies highlight the potential for optimized, cost-effective, sustainable, and scalable production of phycocyanin.

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Poster Presentation ID: 1264

An Experimental Investigation into the Effects of *Hedera helix* L. Extract on Student Stress Reduction and Its Antibacterial Activity Under Controlled Laboratory Conditions

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ARTICLE INFO	ABSTRACT
Keywords: Medicinal plants Phytotherapy Antibacterial activity	In recent decades, growing awareness of the risks associated with synthetic pharmaceuticals has led to an increased interest in natural medicinal resources (Ng et al., 2022). Against this backdrop, the present study aimed to investigate the effects of <i>Hedera helix</i> L. (ivy) extract on stress reduction among students, as well as its antibacterial activity. Sixty female students from grades seven through nine were randomly selected to participate in a field study, during which they consumed ivy herbal tea on four separate occasions. Stress levels were assessed both before and after consumption using a validated standard stress questionnaire. The results demonstrated a statistically significant decrease in stress across all three grade levels, with the most pronounced reduction observed among ninth-grade students. Additionally, the antibacterial properties of the ivy extract were evaluated using the disk diffusion method against four bacterial strains, comprising two Gram-positive and two Gram-negative species. The findings revealed a stronger inhibitory effect against Gram-positive bacteria, with <i>Staphylococcus aureus</i> displaying the largest zone of inhibition. Phytochemical analysis identified bioactive compounds such as saponins, flavonoids, and phenolic compounds within the extract, which are believed to exert their effects by disrupting bacterial cell membranes and modulating the hypothalamic-pituitary-adrenal (HPA) axis in humans (Song et al., 2014). These results suggest that ivy extract may serve as a safe, natural therapeutic agent for improving mental health and reducing the risk of bacterial infections. It is recommended that these findings be considered in the development of school health policies and the advancement of indigenous herbal pharmaceutical products.

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Poster Presentation ID: 1265

Comparative phytochemical analysis of the species labeled as “*Badranjbouyeh*” or Lemon balm in the herbal markets of Iran

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ARTICLE INFO

Keywords:

Medicinal plants
GC-MS analysis
Chemical constituents
Authentication
Melissa officinalis

ABSTRACT

The importance and economic value of medicinal plants and herbal products have increased over the past few decades in Iran due to their traditional significance and utilization in folk remedies. However, the herbal medicinal trade faces a significant concern: misidentification and inadvertent adulteration of medicinal plants. The considerable morphological similarities among various species and the limited botanical knowledge of some herbalists (or attars) could be the probable reasons for this issue. A common example is the prevalence of mislabeling of different species identified and labeled as “*Badranjbouyeh*” or lemon balm. Its therapeutic effect in Iranian folk medicine, including cardiotonic, memory enhancement, treatment of melancholia, palpitations, and headache, dates back centuries [1,2]. In this study, the chemical constituents of the hydrodistilled essential oil of 9 samples labeled as *Badranjbouyeh* collected from various herbal markets in Iran were investigated and analyzed using GC-FID and GC-MS analyses. Results indicated different genera including *Melissa*, *Dracocephalum*, *Hymenocrater*, *Asperugo*, and *Nepeta* were identified as *Badranjbouyeh*. The major components of the essential oil of *Melissa officinalis* L. were neral (4.63-10.46%), geranial (5.81-13.56%), caryophyllene E (3.67-10.01%), and caryophyllene oxide (21.62-22.84%). *Dracocephalum* spp. were primarily composed of neral (15.73, 19.97%), geraniol (4.38, 18.58%), geranial (19.46, 23.26%), and geranyl acetate (13.58%). In *Hymenocrater* spp., the major components were 1,8-cineole (4.47, 4.98%), 6,10,14-Trimethyl-2-pentadecanone (2.56, 5.16%), spathulenol (2.90, 5.28%), and caryophyllene oxide (3.18, 4.86%). *Asperugo procumbens* L. was composed of 6,10,14-Trimethyl-2-pentadecanone (22.11%), caryophyllene oxide (7.22%), and isopropyl tetradecanoate (4.32%). The presence of nepetalactone isomer (12.57%) in *Nepeta* sp., characterized it chemotaxonomically from the other species. Accurate identification and authentication of medicinal plants are crucial for ensuring efficacy and safety in herbal medicines. Utilizing multidisciplinary collaborative approaches including phytochemical techniques could be a promising methodology for plant species identification.

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Poster Presentation ID: 1267

Exploring the Anti-Allergic Activity of Polyphenols Isolated from the Marine Brown Macroalga *Sargassum angustifolium*

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ARTICLE INFO

Keywords:

Anti-Allergic capacity

S. angustifolium

Polyphenols

ABSTRACT

Food allergies are prevalent globally and can provoke severe hypersensitive reactions in individuals. Classified as type I allergies, these reactions involve mechanisms characterized by the degranulation of mast cells and the subsequent release of mediators such as histamine, leukotrienes, and prostaglandins due to antigen-IgE interactions on cell membranes. Hyaluronidase (HAase, EC 3.2.1.35), an enzyme that cleaves hyaluronic acid in extracellular matrices, is significantly implicated in allergic responses. Various medications, including corticosteroids, antihistamines, nonsteroidal anti-inflammatory drugs (NSAIDs), and aspirin, are widely used to treat inflammatory and allergic disorders. While effective in alleviating symptoms, these drugs can cause significant side effects, especially with long-term use, highlighting the need for new treatments with better tolerability. Marine algae are a promising source of bioactive metabolites, producing a range of compounds such as carotenoids, terpenoids, polyphenols, and polysaccharides. These natural products exhibit diverse biological activities, including anti-inflammatory and anti-allergic properties, making marine algae a potential resource for developing innovative pharmaceuticals and essential nutrients. However, studies have primarily focused on a limited number of algal species, highlighting the need for further exploration of diverse seaweeds in different regions for their potential anti-hyaluronidase effects. The aim of this study was to screen the inhibitory effect of brown algal *Sargassum angustifolium* for natural extracts with anti-allergic activity using an in vitro assay. The total polyphenol content of the ethanolic extract was determined using Folin-Ciocalteu's method. Moreover, the crude extract was further evaluated for its anti-allergic capacity against hyaluronidase using the modified Morgan-Elson method. Results showed a total polyphenol content of 2.5% in the ethanol extracts. The hyaluronidase inhibition assay indicated that the extracts from *Sargassum angustifolium* had a considerable IC₅₀ of $139.46 \pm 0.67 \mu\text{g mL}^{-1}$, while previous investigations reported the IC₅₀ values of *Laminaria japonica*, *Sargassum thunbergii*, and *Fucus guiry* extracts as 148, 269, and 690.8 $\mu\text{g mL}^{-1}$, respectively. This suggests that *Sargassum angustifolium* is a suitable inhibitor of hyaluronidase, indicating promising potential for the development of natural antiallergic medicines or functional foods through further exploration of brown macroalgae from the Persian Gulf.

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Poster Presentation ID: 1268

Chemical Composition of the Essential Oil of *Semenovia dichotoma*

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ARTICLE INFO

Keywords:

Essential Oil
Asteraceae Family
Semenovia dichotoma
Clevenger apparatus

ABSTRACT

In the present study, the aerial parts of *Semenovia dichotoma*, belonging to the Asteraceae family, were subjected to essential oil extraction. The plant material was collected from the Gardane Bijan area, located in Kohgiluyeh and Boyer Ahmad Province, Iran. Essential oil extraction was performed using the hydro-distillation method with a Clevenger-type apparatus for a duration of four hours. The extraction process yielded 0.6% essential oil based on the dry weight of the plant material. The obtained oil exhibited a yellowish-green color and possessed a strong, penetrating aroma. Following extraction, the essential oil was dried over anhydrous sodium sulfate to remove any remaining moisture and was subsequently analyzed using gas chromatography-mass spectrometry (GC/MS). The chemical profiling revealed a total of 33 constituents in the oil composition (88.27% identified by GC/MS analysis and search of other references of the author). The major components identified included caryophyllene oxide (22.48%), β -pinene (8.97%), β -caryophyllene (7.04%), and limonene (6.50%), which collectively accounted for a significant proportion of the total oil content. In comparison to a previous study on the essential oil of *S. dichotoma*, notable differences were observed. In the earlier report, only 26 components were identified, and the yield of essential oil was markedly lower at 0.08%. Additionally, certain compounds such as thymol and 2-methyl naphthalene, which were reported in the previous study, were not detected in the present investigation. These differences may be attributed to various factors such as geographical location, climatic conditions, soil composition, and the time of plant collection, all of which are known to influence the qualitative and quantitative composition of essential oils. Overall, the findings of this study contribute valuable information to the phytochemical characterization of *Semenovia dichotoma* and highlight the potential variability in essential oil composition within this species.

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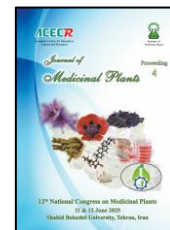
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Poster Presentation ID: 1269

Synthesize and Evaluation of a Molecularly Imprinted Polymer combined with adsorption Resins for Selective and Efficient Extraction of Rebaudioside A from *Stevia rebaudiana*

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ARTICLE INFO	ABSTRACT
Keywords: <i>Stevia rebaudiana</i> Rebaudioside A Adsorption resins Molecularly Imprinted Polymers	This study aimed to design and synthesize a molecularly imprinted polymer (MIP) for the selective extraction of rebaudioside A from crude <i>Stevia</i> extract and evaluate its performance via high-performance liquid chromatography (HPLC). Initially, a 10% aqueous extract of <i>Stevia</i> leaves was prepared, purified by pH adjustment, filtration, and passage through four separation columns packed with distinct ion-exchange and adsorption resins: LXS868, LXS861, LXS865, and LXS869. Subsequently, the MIP was synthesized using methacrylic acid (functional monomer), ethylene glycol dimethacrylate (EGDMA, cross-linker), and azobisisobutyronitrile (AIBN, initiator) in the presence of rebaudioside A as the template molecule, with chloroform as the porogenic solvent. Template removal was achieved by refluxing in a methanol-acetic acid mixture (1,2). The polymer was sieved, activated, and exposed to the purified extract for selective adsorption of rebaudioside A, followed by methanol-based desorption. Characterization by HPLC confirmed the efficient and selective binding of rebaudioside A by the MIP. Comparative analysis against non-imprinted polymer (NIP) revealed higher binding capacity and selectivity of the MIP (3). Fourier-transform infrared spectroscopy (FT-IR) verified the presence of functional moieties involved in template binding, and field-emission scanning electron microscopy (FE-SEM) demonstrated the porous morphology conducive to analyte capture. Among the ion-exchange and adsorption resins tested, LXS868 exhibited the highest concentration of rebaudioside A (22,407.8 ppm), followed by LXS861 (10,975.8 ppm), LXS865 (7,567.3 ppm), and LXS869 (6,558.8 ppm). Using the synthesized MIP, rebaudioside A was extracted with a purity of 92.8%, demonstrating the high selectivity and efficiency of the developed method. This study introduces a reproducible, selective, and efficient extraction approach for rebaudioside A, with promising potential for applications in food and pharmaceutical industries.

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Poster Presentation ID: 1270

Effects of organic and biological fertilizers on nitrogen uptake, morphological traits, and shoot yield of European Borage (*Borago officinalis* L.)

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ARTICLE INFO

Keywords:

Compost
European borage
Flowering shoot
Growth-promoting
Bacteria
Mycorrhiza

ABSTRACT

Fertilizer management is a key factor in the successful cultivation of medicinal plants [1]. The use of organic and biological fertilizers in producing these plants is significant, aiming to eliminate or significantly reduce the use of chemical inputs, enhance soil fertility, and improve plant growth and quality [2]. Therefore, to investigate the effects of ecological inputs on certain characteristics of the medicinal plant European borage (*Borago officinalis* L.), a factorial experiment was conducted using a completely randomized block design with three replications during 2018–2019 in Fahlian, Noorabad, Fars Province, Iran. The first factor was compost application at three levels (0, 5, and 10 tons per hectare), and the second factor was biological fertilizer at four levels (control, mycorrhiza, Bacillus, and a combination of mycorrhiza + Bacillus). The studied parameters included leaf nitrogen content (%), morphological traits (number of flowers per plant, leaf area index, and thousand-seed weight), and shoot yield. According to the results, the highest nitrogen content (1.54%), number of flowers per plant (602), leaf area index (3.67), thousand-seed weight (30.47 g), and shoot yield (60.65 g/m²) were recorded in the treatment with 10 tons of compost per hectare combined with both biofertilizers. The lowest values for these traits were observed in the control treatment. In general, the application of organic compost and the tested biofertilizers (mycorrhiza and Bacillus) had positive effects on the evaluated traits of European borage, especially on the key trait of shoot yield. Notably, the combined application of compost and biofertilizers (10 tons per hectare plus a combination of mycorrhizal and bacterial inoculants) had the most significant impact on improving these traits. Therefore, considering the adverse effects of chemical fertilizers and the beneficial impacts of organic and biofertilizers, the use of such sustainable inputs is recommended for the successful and eco-friendly cultivation of European borage.

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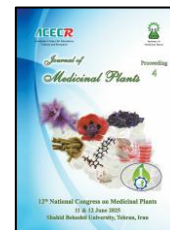
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Poster Presentation ID: 1271

Effects of biofertilizers on chlorophyll content, nutrient uptake, and shoot dry weight of lemon Balm (*Melissa officinalis* L.) under water stress conditions

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ARTICLE INFO

Keywords:

Growth promoting
bacteria
Lemon balm
Mycorrhiza
Shoot dry weight

ABSTRACT

Water stress is one of the most important production constraints in arid and semi-arid regions. On the other hand, in conditions of water stress, the availability of various nutrients in the soil is affected and significant changes occur. One of the important needs in agricultural planning to achieve high yield and desired quality, especially in medicinal plants, is to evaluate different plant nutrition systems, including the use of biofertilizers. With the right method of increasing soil fertility and plant nutrition, it is possible to increase the efficiency of inputs while preserving the environment, reducing erosion and preserving biodiversity. Therefore, in order to evaluate the effect of biofertilizers on some characteristics of lemon balm (*Melissa officinalis* L.) under water deficit stress, an experiment was carried out in the research greenhouse of Yasouj University in 2019 in a factorial manner in form of a completely random basic design with 3 replications. The first factor included the irrigation regime at 3 levels (irrigation after 20, 40 and 60% soil moisture depletion) and the second factor was biological fertilizer at 4 levels (control, arbuscular mycorrhizal fungus *Funneliformis mosseae*, *Bacillus subtilis* bacteria and mycorrhizal + *Bacillus*). The investigated factors included amount of leaf elements (nitrogen, phosphorus, and potassium), leaf chlorophyll content and shoot dry weight. The results of mean comparison showed that with increasing water deficit levels from 20 to 60% moisture depletion in the soil, all studied traits showed a decreasing trend. The use of mycorrhizal fungi and bacteria was evaluated positively compared to their non-use, so that in all three levels of water regime in the studied traits, the highest amount of these traits was obtained from the combined treatment of these two biofertilizers. Inoculation with mycorrhizal fungi increased the biomass of the aerial parts compared to control by increasing the absorption of nutrients from the soil and consequently increasing the photosynthetic capacity of the plant. Based on the results obtained from this experiment, it can be stated that although the dry weight of the plant is reduced by reducing the amount of water consumed and consequently the occurrence of water stress, the use of biofertilizers, especially at high levels of water stress, can partially reduce the adverse effects of stress on the production performance of this plant, which can be attributed to the positive effect of biofertilizers in improving the nutritional conditions of plants under stress conditions.

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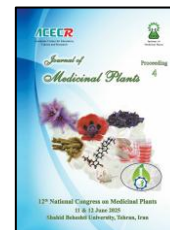
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Poster Presentation ID: 1272

Effects of biofertilizer treatments on physiological and morphological responses of milk thistle (*Silybum marianum* L.) under different irrigation regimes

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ARTICLE INFO	ABSTRACT
Keywords: Biofertilizer Dry weight Growth-promoting bacteria Irrigation regime Mycorrhiza.	Water stress is one of the major factors contributing to the reduction of yield in both agricultural and medicinal plants [1]. As the global trend in medicinal plant production shifts toward improving both the quantity and quality of active compounds, nutrient management particularly through the application of biofertilizers under various environmental conditions has emerged as a sustainable and compatible approach for enhancing medicinal plant productivity [2]. In this study, the effects of biofertilizers on selected traits of milk thistle (<i>Silybum marianum</i> L.) under different irrigation regimes were investigated. The experiment was conducted in a factorial arrangement based on a completely randomized design with three replications in the research greenhouse of Yasouj University. The first factor was drought stress at three levels (irrigation after 20%, 50%, and 80% soil moisture depletion), and the second factor was biological fertilizer at four levels: control, arbuscular mycorrhizal fungi (<i>Funneliformis mosseae</i>), <i>Bacillus subtilis</i> bacteria, and a combination of both microorganisms. The evaluated traits included chlorophyll content and morphological characteristics such as plant height, thousand-seed weight, and dry weights of roots and shoots. The results indicated that with increasing irrigation intervals, chlorophyll content and morphological traits particularly root dry weight, thousand-seed weight, and shoot dry weight decreased significantly. The combined treatment of mycorrhizal fungi and <i>Bacillus subtilis</i> had the most pronounced positive effect on improving these traits, followed by mycorrhizal fungi alone. The highest plant height was recorded under low-stress conditions (irrigation after 20% soil moisture depletion) and the combined application of both biofertilizers. Based on the findings of this study, although reduced irrigation and resulting water stress led to a decrease in chlorophyll content and overall plant growth, the application of biofertilizers particularly under severe water stress helped to mitigate the adverse effects of drought. This improvement can be attributed to the positive role of biofertilizers in enhancing plant nutrition and stress tolerance under suboptimal moisture conditions.

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Poster Presentation ID: 1274

Comparative Study of Maceration, Ultrasonic, and Spray Drying Extraction Methods on the Phytochemical and Antibacterial Properties of *Moringa oleifera*

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ARTICLE INFO

Keywords:

Moringa oleifera
Ultrasonic extraction
Spray dryer
Phytochemical
properties
Antioxidant activity

ABSTRACT

Moringa oleifera, commonly known as “Ghaz-e Roghani” in southern Iran, is a tropical tree recognized for its high nutritional and medicinal value. It is rich in essential minerals, vitamins, proteins, and antioxidants. Nearly all parts of the tree, including the leaves, pods, and seeds, are edible and exhibit notable therapeutic properties. Due to these unique features, *Moringa oleifera* is often referred to as “The Miracle Tree.” This study investigated the influence of different extraction methods and solvents on the yield, total phenolic content, total flavonoid content, and antioxidant activity of *Moringa oleifera* leaves extract. The leaves were dried, ground, and extracted using distilled water, methanol, and ethanol through maceration, ultrasonic-assisted extraction, and spray drying (1). Total phenolics were measured using the Folin–Ciocalteu method, flavonoids through the aluminum chloride assay, and antioxidant activity by the DPPH radical scavenging assay (2,3)

Phytochemicals	Total phenols	Total flavonoids	Antioxidant Act. (As. A) (IC ₅₀)
Extraction methods			
Maceration	780.4 mg/L	731.9 mg/L	748.5 mg/g
Ultrasonic	24.22 mg/L	1025.7 mg/L	543.7 mg/g
Spray drying	361.8 mg/L	439.4 mg/L	1128.3 mg/g

The results showed that maceration yielded the highest total phenolic and flavonoid content, followed by spray drying, then ultrasonic extraction. The best result for total flavonoids was obtained by ultrasonic extraction. For antioxidant activity, ultrasonic extraction was most effective (lowest IC₅₀). These results suggest that *Moringa oleifera* leaves are a valuable source of bioactive compounds with potential applications in food, pharmaceutical, and cosmetic industries. This is the first regional study of its kind, offering promising insights for further industrial development.

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Poster Presentation ID: 1275

Understanding the Role of Plants in the Indigenous Culture in the South of Yazd Province (An Ethnobotanical perspective)

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ARTICLE INFO	ABSTRACT
Keywords: Ethnobotany Malvaceae Lamiaceae Traditional usages Medicine	Ethnobotany explores the dynamic relationship between human cultures and plant biodiversity, documenting traditional knowledge of plant utilization [1]. This valuable science is typically transmitted orally across generations; however, it faces the risk of erosion as elder community members pass away [2]. Thus, systematic documentation of this knowledge is imperative to safeguard it for future research and application. Recognizing this, the present study investigates common medicinal plants with their known traditional uses in South of Yazd Province in central part of Iran. To achieve this goal, semi-structured interviews were conducted with local residents with diverse backgrounds. Plant samples were collected alongside detailed ethnobotanical data. Taxonomic identification of the specimens was carried out using authoritative botanical references. Findings indicate that Lamiaceae, Asteraceae and Malvaceae families were the most frequently utilized in the region. Flowers with 41.17%, leaves with 35.29%, stems with 29.41%, roots and seeds with 11.76%, were used for ailment treatments (76.4%), culinary uses (17.6%), industrial uses (11.7%) and even cosmetic purposes. Also, some local uses of plants were reported exclusively for the region and country in this research. Given the profound value of this knowledge, further exploration and documentation are essential to ensure its preservation. By doing so, we not only honor the wisdom of past generations but also provide a foundation for future scientific and economic advancements. This study highlights the importance of safeguarding Iran's ethnobotanical heritage as a vital resource for sustainable development and innovation.

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Poster Presentation ID: 1276

From Traditional business to Global Markets: A Comparative Study of the Current and Desired Status of Medicinal Plants Export in Iran

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ARTICLE INFO

Keywords:

Medicinal plants
Exports
Global trade
Gap analysis
Sustainable
development

ABSTRACT

Medicinal plants have gained global significance due to increasing demand in traditional medicine, health, cosmetics, and food industries. However, the supply of these products faces environmental and economic challenges. This study examines the export status of Iran's indigenous medicinal plants and analyzes the gap between current and desired conditions in global trade from 2020 to 2024. Data were collected from credible sources, including the FAO, Central Bank, Customs Trade Yearbook, and the Ministry of Agricultural Jihad. A 38-item questionnaire was designed, focusing on contextual, behavioral, and structural factors, export mechanisms, and product specifications. The study population consisted of medicinal plant exporters, selected through purposive sampling. Findings indicate that industry support extends beyond financial aid, though financial backing remains crucial for sustainable development. Field studies reveal that many of the country's potential capacities are hindered by the lack of a comprehensive, region-specific program. Managers in research centers and ministries often lack long-term strategies for sustainable production, processing, and export, leading to fragmented, short-term initiatives with limited impact. Disjointed efforts frequently result in redundant studies or abandoned programs due to managerial or organizational changes. This research underscores the need for cohesive, sustainable strategies to develop medicinal plant exports and strengthen their value chain. It serves as a guide for traders, researchers, and policymakers, helping them navigate the challenges and opportunities in this industry.

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Poster Presentation ID: 1277

Evaluation of Poor Quality Irrigation Water Effect on Growth Characteristics of Milk Thistle (*Silybum marianum* L.)

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ARTICLE INFO

Keywords:

Silybum Marianum L.

Water quality

Salinity

Growth characteristics

ABSTRACT

Irrigation water quality significantly impacts plant cultivation. Milk thistle (*Silybum marianum* L.) is considered one of the most important medicinal plants for the treatment of liver diseases due to the presence of flavonolignans in its fruits. It has low water requirements, so if the performance of this plant is examined in conditions with poor water quality, it can be introduced as one of the suitable medicinal species for arid and semi-arid regions that face the problem of water shortage. The aim was to investigate how poor-quality irrigation water affects the growth of *Silybum Marianum* L. Irrigation water samples with sodium absorption ratios (SAR) of 3, 11, 18.5, 27, and 35 were prepared by combining NaCl and CaCl₂ salts, resulting in EC values of 1, 2.5, 5, 8.5, and 11.7 dS/m, respectively. Distilled water served as the control. After disinfection, seeds were placed in Petri dishes under controlled conditions in a germinator. Germinated seeds were then transferred to 3 kg pots with sandy loam soil and kept in a greenhouse. During growth, water content was maintained at F.C. by weighing the pots daily. After 20 weeks, plants were harvested, and plant height, leaf area, and dry weight of the aerial part were measured. The results showed, increasing SAR to 27 and 35 levels caused a 52 and 95 percent reduction in plant height, respectively. The leaf area in the control sample decreased from 174 to 71 cm²/plant at SAR equal to 27. Also, plant dry weight decreased by 40 percent from 1.62 g/plant in the control sample to 0.98 g/plant at SAR 37. The finding indicated that the decrease in the quality of irrigation water caused a significant decrease in the studied characteristics. In general, according to the results obtained, it seems that milk thistle does not have high resistance to salinity.

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Poster Presentation ID: 1278

How Climate Shapes Saffron (*Crocus sativus* L.) Quality and Yield: Regional differences in cultivated saffron of Iran

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ARTICLE INFO	ABSTRACT
Keywords: Saffron Yield Phytochemicals	Saffron (<i>Crocus sativus</i> L.) is recognized as one of the world's most valuable medicinal and industrial plants. Iran ranks first globally, producing over 90% of the world's saffron. Saffron has several chemical compounds that give it special properties such as color, aroma, and unique taste. The chemical compounds of saffron are divided into three main categories: crocin, picrocrocin, and safranal. Each of these compounds plays a special role in the medicinal properties of saffron. These compounds are found in different parts of the saffron plant, especially the stigmas. In addition to its delicious taste and aroma, saffron has revealed its therapeutic and pharmacological properties in the treatment of many human diseases. In this study, the variation in dry stigma yield and the content of active compounds (crocin, picrocrocin, and safranal) was evaluated in the saffron clones cultivated across 30 regions of Iran. There was a significant difference between the different regions in terms of dry stigma yield and the content of active compounds ($p < 0.01$). The highest dry matter values were recorded in the regions of Qaen, Quchan, Sarfiroozabad, Selsele, Tiran, and Karvan. The concentrations of crocin, picrocrocin and safranal were also higher in these regions. The variation in saffron quality was clearly related to the climatic differences of the cultivation regions. The results showed that the climate significantly influenced dry matter production and phytochemical composition. These findings highlighted the importance of selecting appropriate cultivation areas to achieve the highest quality saffron.

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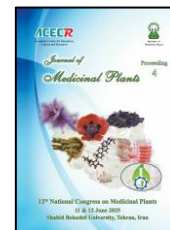
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Poster Presentation ID: 1279

AlphaFold-Based Discovery of Natural 5-Lipoxygenase Inhibitors for Meat Preservation via Pharmacophore Modeling and Molecular Dynamics

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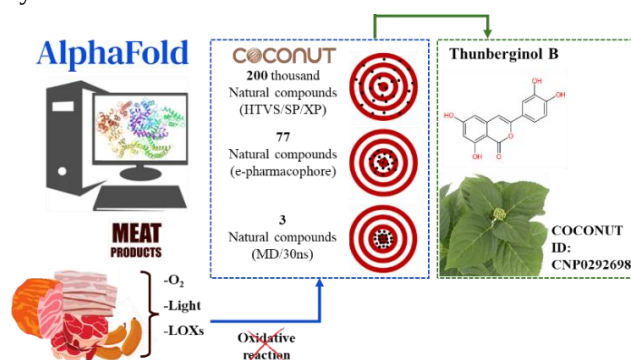
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ABSTRACT

Keywords:

AlphaFold
Meat product
Lipid oxidation
Virtual screening
Molecular Dynamic

Lipid content in meat products has a crucial impact on their flavor and tenderness which are prone to degradation due to oxidation. Lipoxygenases (LOXs) enzymes facilitate the oxidation of polyunsaturated fatty acids and virtual screening to find their inhibitors is one of the effective solutions in maintaining the quality and shelf life of meat products [1]. In virtual screening, the absence of protein crystal structure was a limitation which recently has been solved with introducing AlphaFold prediction as a neural network-based method to predict the 3D structures of proteins with atomic-level precision [2]. For this purpose, the AlphaFold-predicted structure of ALOX5 (AF-F1MQ78-F1-v4) was downloaded and prepared for virtual screening. Approximately 200,000 natural compounds from the Coconut database were screened using high-throughput virtual screening (HTVS), standard precision (SP), and extra precision (XP) docking protocols. Seventy-seven ligands with docking scores more negative than $-9.12 \text{ kcal} \cdot \text{mol}^{-1}$ were enriched based on an e-pharmacophore study. From this enriched set, 10% of ligands exhibiting the highest fitness scores (greater than 1.9) were selected. Enrichment analysis revealed a receiver operating characteristic (ROC) value and an area under the accumulation curve (AUAC) value both equal to 0.97, demonstrating the excellent performance of the e-pharmacophore virtual screening method and its ability to successfully recover all active compounds from the decoy set. Molecular dynamics analysis was performed on three ligands (Coconut IDs: CNP0108029, CNP0155383, and CNP0292698) that exhibited the highest induced fit docking (IFD) scores, specifically -1496.74 , -1494.09 , and $-1493.27 \text{ kcal} \cdot \text{mol}^{-1}$, respectively. Among these, the ligand with ID CNP0292698 showed the greatest stability, maintaining close interaction with the protein over a 30 ns simulation period, achieving stabilization approximately after 1 ns. In conclusion, **Thunberginol B** could be considered a potential inhibitor for the preservation of meat products, and its efficacy warrants further investigation through in vitro analysis.



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Poster Presentation ID: 1280

Effect of Livergol on Reproductive Complications of Experimental Cholestasis in Mature Male Rats

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ARTICLE INFO	ABSTRACT
Keywords: Cholestasis Livergol Rat Sperm Testis	Cholestasis, a multi-faceted complication resulting from an imbalance between bile production and secretion, occurs in many diseases and can lead to further damages. This study aimed to investigate the effects of Livergol on the reproductive outcomes of experimental cholestasis in mature male rats. Twenty mature male rats were randomly divided into four groups. Group 1 consisted of five healthy rats kept as controls without treatment until the end of the study. In Group 2 (sham), laparotomy and ductal manipulation without ligature were performed. In Group 3 (experimental cholestasis), two ligatures were placed a few millimeters apart in the common bile duct, and the section between the ligatures was excised. In Group 4 (experimental cholestasis + Livergol), after inducing cholestasis, rats were treated with Livergol (300 mg/kg; orally) for four weeks. Testicular histopathological changes and sperm parameters were evaluated. Oral administration of Livergol significantly improved the testicular biopsy index (Johnsen's score) and significantly decreased the testicular histopathological index (Cosentino criterion) following the induction of experimental cholestasis in rats. The findings showed a significant increase in the concentration, viability, and motility of epididymal sperms in the Livergol-treated rats. It can be concluded that Livergol reduces testicular damage and improves sperm traits in a rat model of experimental cholestasis.

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Poster Presentation ID: 1281

Studying The Effects of Magnetic Nanoparticles and *Achilea millefolium*, on Bacterial Infection

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ARTICLE INFO

Keywords:

Anti Bacterial
Nano Magnetic Particle
Plant
Achilea millefolium,

ABSTRACT

Considering that urinary tract infection is one of the most common infections and on the other hand, if antibiotics are used to treat it, we face the challenge of antibiotic resistance, so using an appropriate therapeutic method such as nanoparticle synthesis will be of great help in treating infections. Also, considering that the synthesis of nanoparticles by chemical and physical methods is costly and harmful and causes great damage to human health and the environment, and considering that there are many plants on earth that have high antibacterial and antioxidant properties, the use of green nanotechnology as an efficient, cheap and environmentally safe alternative method for producing nanoparticles with specific properties is of great importance. Yarrow (*Achilea millefolium*) is the dominant species of the genus *Achilea millefolium*, which has been used as a traditional medicine. It also has various therapeutic effects such as antioxidant, antibacterial, antifungal, analgesic and plays a role in protecting the liver and treating digestive diseases. Yarrow essential oil has antioxidant and antibacterial properties against gram-positive and gram-negative bacteria. Iron nanoparticles synthesized from yarrow extract showed the highest inhibition zones of 30 mm and 25 mm at a concentration of 250 mg/ml against gram-negative *Escherichia coli* and gram-positive *Staphylococcus aureus*, respectively. The antibacterial activity of the nanoparticles was investigated in comparison with standard antibiotics such as gentamicin and tetracycline; it was found that these nanoparticles have strong antibacterial properties and are very stable chemicals.

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Poster Presentation ID: 1282

Mycosporine-Like Amino Acids from *Gracilaria salicornia*: A Natural Sunscreen Against UVB-Induced Oxidative Stress and Cell Damage

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ARTICLE INFO	ABSTRACT
Keywords: <i>Gracilaria salicornia</i> Antioxidant capacity MMAs Skin protection Cell viability	Individuals are regularly exposed to sunlight, with the skin, as the primary organ, absorbing ultraviolet (UV) radiation. While UV radiation aids in vitamin D synthesis, it can also lead to skin damage, including photodamage, photoaging, and an increased risk of skin cancer. To mitigate these effects, advancements in sunscreen formulation are necessary, ensuring safety for both humans and the environment. UVB exposure increases the production of reactive oxygen species (ROS), which can activate pathways leading to oxidative stress and DNA damage. Mycosporine-like amino acids (MAA) are the most effective natural UVA-absorbing compounds, found in various organisms, including cyanobacteria, red algae, dinoflagellates, corals, and marine invertebrates. <i>Gracilaria salicornia</i> is an edible red alga typically found in the intertidal zones and upper subtidal areas on various surfaces throughout the Persian Gulf and Oman Sea. This article presents findings from a study on the effectiveness of MAAs extracted from <i>G. salicornia</i> in preventing photoaging damage caused by UVA exposure, highlighting the protective properties of MAAs against oxidative stress and loss of cell viability. Herein, the methanolic extract of the samples was analyzed using an HPLC system for the determination of MAAs. The antioxidant levels of the MAAs were evaluated by measuring the reduction of the stable free radical 2,2-diphenyl-1-picrylhydrazyl (DPPH). Furthermore, to examine cell protection, we assessed viability of human embryonic kidney 293 (HEK-293) cells exposed to UVA at 320 nm for 10 minutes using the MTT assay. The components of MAAs identified by HPLC included shinorine, porphyra-334, and palythine. MAAs significantly scavenged DPPH free radicals compared to the control group, and their free radical scavenging ability increased with concentration, reaching 65% in the supernatant containing 1 mg/mL of MAAs, compared to a scavenging rate of 50% for vitamin C. The results also indicated that MAAs from <i>G. salicornia</i> at concentrations of 0.25% enhanced the viability of HEK-293 cells in a dose-dependent manner, yielding a viability rate of 98.1% after exposure to irradiation, compared to 58 % for the control. Thus, the preliminary findings of this study reveal that <i>G. salicornia</i> could be considered a medicinal plant, and its MAAs, have significant potential as natural skin care agents due to their high UV absorption and protection properties, as well as their strong antioxidant activities.

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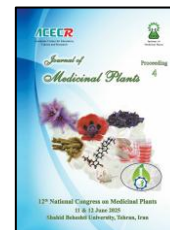
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Poster Presentation ID: 1283

Evaluation of the antibacterial effect of nettle extract on *Escherichia coli* strains isolated from urinary tract infections

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ARTICLE INFO

Keywords:

Nettle extract
Antibacterial effect
Escherichia coli
Urinary tract infection

ABSTRACT

In the past decades, the emergence and spread of bacteria with multiple antibiotic resistance has become a global concern. One of the main causes of the high rate of antibiotic resistance in bacteria isolated from clinical samples is the indiscriminate use of antibiotics to treat or control infections. Plants with antibacterial activity can be used as natural antimicrobial compounds to control infectious diseases. Stinging nettle (*Urtica dioica*) is a medicinal plant that has various uses in traditional medicine. In some studies, nettle has been reported to have antiviral, antibacterial, and antifungal activities. In this study, the antibacterial effect of nettle extract on *Escherichia coli* strains isolated from urinary tract infections was investigated. Thirty strains of *Escherichia coli* were isolated from patients with urinary tract infections. Antibiotic resistance rate of the isolated bacteria against 12 commonly used antibiotics was determined by disk diffusion method. Agar diffusion test and minimum inhibition concentration (MIC) assay were performed to assess the antibacterial effect of aqueous nettle extract on the isolated bacteria. Antibiotic resistance to three antibiotics was observed in all *Escherichia coli* strains. The highest amount of antibiotic resistance was against ampicillin (90.9%), trimethoprim-sulfamethoxazole (72.7%), cefixime (72.7%), ciprofloxacin (72.7%), and tetracycline (63.6%). The lowest antibiotic resistance was against nitrofurantoin (18.2%), amikacin (27.3%), and gentamicin (36.4%). The nettle aqueous extract showed no antimicrobial effect on *Escherichia coli* strains in any of the concentrations tested. These results suggest that nettle aqueous extract has no antibacterial activity against *Escherichia coli* strains isolated from urinary tract infections.

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Poster Presentation ID: 1284

Magnesium oxide nanoparticles regulated production, transport and storage of phenolic compounds in leaf and bulb of *Narsisus tazetta* L.

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ARTICLE INFO	ABSTRACT
Keywords: MgO-NPs <i>Narsisus tazetta</i> Nanoparticles Phenolic contents	Narcissus (<i>Narsisus tazetta</i> L.) is one of the most important flowering plants belonging to the monocotyledonous and Amaryllidaceae family which has flowers with a pleasant and very strong aroma that it is high value in the perfume industry. Due to the presence of secondary metabolites, this plant has medicinal properties and numerous biological activities, including analgesic, antiviral, antibacterial, antifungal, antimalarial, antitumor and cytotoxic effects [1,2]. One of the problems in the production of plant medicinal products is their inadequate nutrition throughout their life cycle. In recent years, nanoparticles have found widespread use in increasing the efficiency of plants to produce bioactive compounds [3]. In this study, the effect of magnesium oxide nanoparticles (MgO-NPs) treatment was investigated on the changes in the contents of the phenolic and flavonoid compounds in <i>N. tazetta</i>. Bulbs of the plant were cultivated in the research farm of Alzahra University and were treated with different concentrations of MgO-NPs by foliar spray method. The results showed that phenolic contents of the leaves were generally higher than the bulbs (2.73- folds in the control). Two weeks after foliar spraying of MgO-NPs, the phenolic content of the bulb increased significantly. Consequently under 50 mg/L MgO-NPs treatment, phenolic content of the bulb increased by 78% compared to the control. While the content of phenolic and flavonoid compounds narcissus decreased in the leaf by 28% and 46%, respectively, compared to the controls. It seems that MgO-NPs, by creating a relationship between the leaf as a photosynthetic organ with active cells for production of precursors and intermediate metabolites (source) and the bulb as a storage organ (sink), create a dynamic balance between the production, transport, and storage of phenolic and flavonoid compounds, and also other secondary metabolites which are effective in the plant defense responses. the findings can be used as a suitable tool to increase the medicinal properties and biological activities of the <i>N. tazetta</i>.

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Poster Presentation ID: 1286

Using Taguchi Orthogonal Array Design to Optimize the Green Synthesis Process of Silver Nanoparticles Using the *Ferula assa feotida* Plant

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ARTICLE INFO	ABSTRACT
Keywords: Silver nanoparticles <i>Ferula assa feotida</i> Sesquiterpene Taguchi Design the experiment	<i>Ferula Asafetida</i>, commonly known as asafoetida or hing, is a perennial herb native to Afghanistan and Iran. It belongs to the Apiaceae family and is mainly cultivated for its resin, which is taken out from the roots and stems of the plant. This perennial baceous plant features hollow stems measuring 5 to 8 cm in diameter, with leaves spanning 30 to 40 cm. During its initial five years, it sprouts ring-shaped leaves that sprawl across the ground, characterized by deep cuts and a dark green hue. This study employed a novel model for assessing the phytosynthesis of silver nanoparticles using Anghoozeh <i>Ferula Asafetida</i> plant extract, Taguchi experimental design, vortexing, and ultrasonication in a cost-effective, one-step process. The aqueous extract served as a reducing and capping agent for the green synthesis of silver nanoparticles. Five independent variables for synthesis temperature, pH, concentration of Anghoozeh <i>Ferula Asafetida</i> plant extract, concentration of silver nitrate solution, and synthesis time were examined, while the intensity of the surface plasmon resonance peak from the silver nanoparticles acted as the dependent variable. The optimal conditions identified were an ultrasonic time of 35 min, pH equal to 6, a concentration of FAPE equal to 6% v/v, a level of silver nitrate solution equal to 3 mM, and a test temperature equal to 48 degrees Celsius. The XRD analysis demonstrates that the silver nanoparticles have the characteristic diffraction patterns of crystalline silver nanoparticles with a face-centered cubic arrangement. The TEM analysis exhibited the presence of well-defined AgNPs with an average size of less than 25 nm and a spherical, and uniform morphology of AgNPs. FTIR analysis identified the compounds in the plant extract, which not only facilitated the reduction of silver ions but also coated the nanoparticles, contributing to their stability and preventing aggregation.

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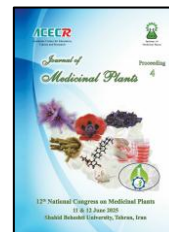
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Poster Presentation ID: 1289

Study of Morphological and Phytochemical Characteristics, Oil Content, and Antioxidants Activity of Some Milk Thistle (*Silybum marianum* L.) Accessions Seed in Iran

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ARTICLE INFO	ABSTRACT
Keywords: Milk thistle Silibin Diversity Cultivation Oil	Milk thistle (<i>Silybum marianum</i> L.) is an annual plant and belongs to the family Asteraceae [1]. The plant is used as a medicinal plant in the treatment of liver diseases [2]. The studied populations were evaluated in Randomized Complete Block Design (RCBD) with three replications in research site at Shahid Beheshti University, Tehran. In this study, phenological traits (greening date, 4 leaves, rosette, stem formation), morphological traits (number of rosette leaves, leaf length and width, plant diameter, capitol diameter, plant diameter, capitol number, plant height, height of the largest branch, thousand seed weight, seed length and diameter), functional (number of seeds per capitol, seed weight per capitol, plant dry weight and yeild per unit area) and phytochemical (oil percentage, silymarin content and total phenol and flavonoid content) of the populations were investigated. The analysis of variance (ANOVA) showed that the phenology and morphology traits were significantly different in all developmental stages. Hamedan population (63.32 days) and Gorgan population (45.22) went through the phenological stages earlier and later than other populations, respectively. The highest content of oil (29.33%), silibinin A (12.44 mg/g DW), silibinin B (19.74 mg/g DW), total phenol (58.29 mg GAE/g DW), and total flavonoid (64.42 mg RE/g DW) was obtained in Saqqez, Hamedan, Hamedan, Kazakhstan and Kazakhstan, respectively. A positive and significant correlation was observed between silibinin A and silibinin B. The variation in morphological and phenological traits and the content of phytochemical compounds among the studied populations may be due to genetic diversity and environmental factors as well as exploitation in pharmaceutical industries.

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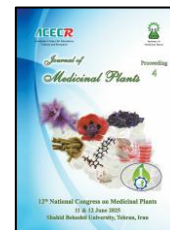
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Poster Presentation ID: 1290

Performance of essential oil of the medicinal plant basil (*Ocimum basilicum* L.) under chitosan and putrescine treatments in hydroponic conditions

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ARTICLE INFO

Keywords:

Spray
Treatment
Polyamines
Essential oil

ABSTRACT

Medicinal plants with rich sources of secondary metabolites provide the basic active ingredients of many drugs. One of the methods used to enhance Secondary Metabolite Production, including terpenoids, etc., is the use of polyamines. The growth and production of essential oils of medicinal plants can be affected by the use of plant growth regulators. The experimental factors included chitosan at three levels (0%, 0.01%, and 0.02%) and putrescine at three levels (0%, 0.01%, and 0.1%). Plants were sprayed as foliar spray at the full growth and flowering stages. In the traits of essential oil percentage and essential oil yield, the highest percentage and essential oil yield were in the treatment of chitosan 0.02% and putrescine 0.01%. And the lowest were related to the treatment of chitosan with a concentration of 0.02 percent and putrescine with a concentration of 0.1 percent. According to these results, it seems that increasing the concentration of treatments reverses the result of the experiment, meaning that at a certain level, these treatments improve the traits. According to the findings of this study, it seems that the use of polyamines and biological elicitors is a suitable approach for biomass and essential oil production in the case of the medicinal plant basil. The results obtained from GC-MS showed that among the plants sprayed with putrescine and chitosan, the highest amount of cineole compound was 14.8%, corresponding to the treatment with chitosan at a concentration of 0.02% and putrescine at a concentration of 0%. And the lowest amount of cineole compound was 65.3%, corresponding to the treatment with chitosan at a concentration of 0.02% and putrescine at a concentration of 0.01%. Considering these results, it seems that chitosan alone increases the cineole compound.

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Poster Presentation ID: 1291

Evaluation of seed germination of milk thistle (*Silybum marianum* L.) primed with cytokinin under salinity stress conditions

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ARTICLE INFO

Keywords:

Benzylaminopurine
Cytokinin
Coefficient of allometry
Germination uniformity
Vigor index

ABSTRACT

Salinity stress is an important abiotic factor that with reduces a plant's ability to absorb water, ion imbalance and germination of seeds. Milk thistle (*Silybum marianum*) is a valuable medicinal plant and is spread in different habitats over several areas in Iran. Plant hormones can affect different plant activities including seed germination. Cytokinin hormone enhance germination of plants under salinity stress conditions. To investigate the impact of priming Milk thistle with 6-Benzylaminopurine (BAP) on germination traits under salinity stress, a factorial experiment was carried out in a completely randomized design (CRD) with four replications at the Physiology and Medicinal Plants Laboratory of the Faculty of Dr. Shariati Skill College of Tehran (TVU). The experimental factors included salinity levels (0, 4, 8, and 12 dS/m) and seed priming with BAP at three concentrations of 0, 200, and 400 μ M. Salinity stress had a negative effect on all studied traits. Priming of seeds with BAP had a significant effect on all investigated traits and reduced the effects of salinity stress. Seed priming with 200 and 400 μ M of BAP increased the length of radicle 13 and 28.4 % than control treatment, respectively. The length of plumul with compared to the control treatment, was also increased by 8.7 and 19.3% in the concentration of 200 and 400 μ M, respectively. As a result of seed priming with BAP, the seed vigor index increased by 23 %, seedling fresh weight by 17.8%, seedling dry weight by 24.1% and seed germination uniformity by 29.4% increased compared to the control treatment. The results showed that priming of milk thistle seeds with BAP cased improve of the germination characteristics in salinity stress condition.

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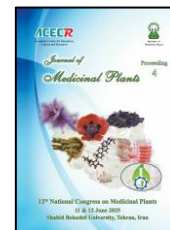
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Poster Presentation ID: 1292

Investigation of antioxidant activity phenolic compounds and flavonoid total of the medicinal plant *Marrubium vulgare* L. in two substrates rock wool and perlite in Soilless cultivation

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ARTICLE INFO

Keywords:

Antioxidant
compounds
Cultivation substrate
Marrubium vulgare
Soilless cultivation

ABSTRACT

Given the increasing importance of medicinal plants in the medical and food industries, studying the bioactive compounds of medicinal plants, especially antioxidant, phenolic compounds, and flavonoid compounds, is of great importance [1]. *Marrubium vulgare* L. is a plant belonging to the Lamiaceae family that is used to treat respiratory problems, ovarian cysts, reduce cholesterol and blood sugar, and as an anti-pain and anti-inflammatory [2]. Cultivation of medicinal plants in the field is associated with problems such as pest attack, presence of weeds and environmental changes and stresses that affect the quantity and quality of medicinal compounds. Soilless cultivation is an alternative method that can produce high quality medicinal plants in a controlled environment [3]. The purpose of this study was to investigate the effect of soilless cultivation conditions on antioxidant activity, phenolic compounds and flavonoids compounds in the medicinal plant in different rock wool and perlite substrates. After sowing the seeds in the desired cultivation substrates, they were irrigated with distilled water until germination. After that, Hoagland solution was used for irrigation three times a week. The samples were harvested after 90 days and the amount of phenolic compounds and flavonoids compounds and antioxidant activity were measured using Folin-Cicalteu's phenol reagent, Aluminum chloride and using DDPH, respectively. This experiment was conducted in a completely randomized design with 3 replications in the research greenhouse of Al-Zahra University in Tehran. The results showed that plants grown in rock wool substrate had higher levels of phenolic compounds and flavonoid compounds than plants grown in perlite substrate. The highest levels of phenolic compounds, flavonoids compounds, and DDPH radical scavenging activity were observed in rock wool substrate. While the lowest levels of DDPH radical scavenging activity were observed in perlite substrate. As a result, cultivated substrates have different chemical and physical properties that can affect plant characteristics. According to the results, it was observed that rock wool substrate has increased the antioxidant properties of this plant compared to other culture substrate.

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Poster Presentation ID: 1294

Ethnobotanical Treasures of Abi Beyglu, Namin, Iran

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ARTICLE INFO

Keywords:

Traditional medicine
Ancestral Knowledge
Ardabil Province
Rosaceae
Lamiaceae

ABSTRACT

For many years, plants have consistently served as food as well as essential life-supporting resources for humans [1]. The utilization of plants based on ancestral knowledge, has been practiced since ancient times. The traditional usage has been systematically explored through ethnobotanical studies, which play a crucial role in the preservation and documentation of traditional knowledge [2]. Due to this fact, Abi Beyglu a city in Namin County (Ardabil province) was investigated for plant species primarily used for medicinal, nutritional, industrial, and other purposes. Plant specimens were gathered from individuals who either possessed specialized knowledge or had acquired traditional ecological knowledge through life-long experience. The collected specimens were then taxonomically classified based on their morphological characteristics and with scientific sources. The result demonstrated that the ethnic people of the region are most familiar with the traditional usage of medicinal plants. Lamiaceae with 4 and Rosaceae with 3 species were the most frequent families among the gathered and used samples in the County. Flowers and leaves (each with about 40 %) and seeds (17 %) are reported as the most frequent used organ of plants in the region. Also, more than 80% of consumption method of plants is reported as infusion. 61 % of medicinal uses were reported as healing of respiratory diseases. Treatment of gastrointestinal illnesses and analgesic (painkiller) agents with 17 % are in the following ranks. During the Human history each nation learned how to deal with the nature surrounding them. One of the crucial steps in adapting with the nature was utilizing plants not just for food but as medicine and even building a shelter. According to this fact the study of ethnobotany plays a vital role in every nation destiny. It can raise awareness among local communities regarding the recognition, sustainable use, and plant biodiversity.

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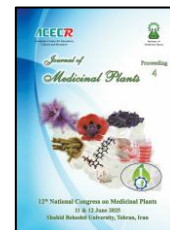
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Poster Presentation ID: 1295

Effect of nutritional treatments on the growth and economical yield of saffron (*Crocus sativus* L.) as a medicinal plant

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ARTICLE INFO

Keywords:

Metabolic function
Organic manures
Productivity
Soil microorganisms
Stigma yield

ABSTRACT

This study aimed to investigate the effects of various nutritional treatments, applied both to the soil and as foliar sprays, on the growth characteristics in saffron. The research was conducted based on a randomized complete block design with four replications over two growing seasons (2021-2023) at a farm located in Cheshmeh Gilas, Mashhad. The nutritional treatments applied per square meter included: A) 5 kg of poultry pellets+100g of potassium sulfate+100g of phosphate+400g of bentonite sulfur+200g of granular humic acid; B) 2.5kg of poultry pellets+60g of potassium sulfate+60g of phosphate+300g of bentonite sulfur+200g of granular humic acid; C) 4 kg of poultry pellets+140g of potassium sulfate+40g of phosphate+300g of bentonite sulfur+300g of granular humic acid; D) 4 kg of poultry pellets+200g of potassium sulfate+100g of phosphate+300g of bentonite sulfur +400g of granular humic acid; E) 5 kg of poultry pellets+200g of potassium sulfate+200g of phosphate+240g of bentonite sulfur+100g of granular humic acid; F) four foliar applications using 31g of Saffron Power fertilizer and three foliar applications using 31g of Saffron Magic during the flowering and vegetative stages; and G) 17 ml of KTS three times after flowering, along with two foliar applications of K-Leaf at a rate of 6.25g during the vegetative growth stage+ 62 ml of Cats applied twice after flowering. The highest leaf length (52.52 mm), number of daughter corms (1574.51 corms.m⁻²), and stigma yield (2.14 g.m⁻²) were recorded for treatments F, A, and B, respectively. For other treatments, the increase exceeded 100%. In conclusion, the application of cow manure increased nutrient availability in the soil, enriched beneficial microorganisms, promoted the metabolic functions of soil microorganisms, enhanced both the yield and quality of saffron, and improved soil microecology. Therefore, the use of organic manures is recommended to boost productivity and improve the quality of saffron.



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Ethnobotanical Study of the most used medicinal plants In Kavanz, Bazman, Iranshahr County in Sistan and Baluchistan Province

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ARTICLE INFO	ABSTRACT
Keywords: Ethnobotany Baluchistan Kavanz Lamiaceae Anacardiaceae	Kavanz is a village in Bazman rural district, Iranshahr county located in Sistan and Baluchestan Province, Iran. "Kavanz" means "land of wild pistachio (benneh) or Pistacia atlantica". The presence of medicinal plants in this region and the widespread of their usage by the local people for treating various ailments [1, 2] were among the factors that led us to this investigation. Data were collected using in-depth interviews with local people. The species' local names, therapeutic properties, methods of application, and the sample of the plants were gathered for scientific studies. The plants then were identified with authentic books and Floras. Results revealed that gathered and identified plants could be divided in 11 families. Lamiaceae with 32 % of frequency and Anacardiaceae and Apiaceae with 25% were the most frequent families respectively. According to locals, most common plant parts used for treatment were plant leaves (56.25%), followed by seeds (25%), flowers and tree gum (each 6.25%). Most of the studied species in this region were used for treating gastrointestinal disorders (37.5%), cold and cough treatment (25%) and urogenital disorders with (18.75 %). Most of the gathered plants were used as medicinal (87.25%) followed by the ones that were known by their nutritional usages (18.75%). Due to climatic condition of the Kavanz villages and the cultural and historical background of it, many exclusive usages of local plants were documented in this research [1]. Given the region's strong ethnobotanical traditions and preferential use of medicinal plants over synthetic drugs, further investigations could reveal novel therapeutic applications of species, potentially enabling their future development into commercial herbal remedies [2].

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Poster Presentation ID: 1297

Design and Fabrication of a Novel Fractional Distillation Tower in Pilot Scale to Refining and purification of Medicinal Plants Essential Oil

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ARTICLE INFO	ABSTRACT
Keywords: Fractional distillation Refining Peppermint oil Zataria oil Pilot plant	Recently, various methods have been considered to shorten the extraction time and improve the extraction efficiency of essential oils (EO), such as the use of ultrasound and microwave, and solid-phase microextraction. Fractional distillation (FD) is the most common method for purifying and enriching EOs due to its ease of use and low investment cost (1). The efficiency of this process is strongly affected by the operating conditions such as temperature and pressure in the distillation column, as well as the mass and energy transfer between the mixed liquid and vapor phases. To standardize EOs with different desired times, it is necessary to use an FD system (2). In this research project a pilot scale equipment was designed and fabricated which consists of two main parts and includes a tank with a capacity of 450 liters and a 9 trays distillation tower with a height of 4.6 meters. The way it works is that the EO was added to the tank of the equipment which filled with RO water and heated until boiling point so that the light components are removed in order based on their vapor pressures and boiling points. The essential oils of some medicinal plants were refined. A purified fraction of EO with a total percentage of 91% of thymol and carvacrol was obtained from crowd essence of <i>Zataria</i> with percentage of 55% of these compounds in initial EO. This equipment was applied for refining of <i>Mentha piperita</i> L. and <i>Eucalyptus globulus</i> L. EO in order to terpen-less of the essences and to achieved maximum amounts of main constituents. Increasing percentage of menthol from 37% to 64% and the increasing of 1,8-cineol from 32% to 70.8% in the peppermint oil and Eucalyptus oil respectively were a wonderful achievement in this pilot plant. In each running of the essential a number of fractions were obtained which had different conditions and percentage of the main effective constituents. Considering the efficiency of this fractional distillation tower, producing of the refined EO of the medicinal plants in high and international standard grades, make this method very applicable and cost-effective.

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Poster Presentation ID: 1299

Assessment of salinity and selenium impact on the biochemical characteristics of tomato

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ARTICLE INFO	ABSTRACT
Keywords: <i>Solanum lycopersicum</i> Salinity SeO₂ Soluble sugars Proline	Agricultural soil salinity is a major issue affecting crop yields in many countries. Currently, about one-third of the world's agricultural land is affected by saline conditions [1]. According to research, selenium (Se) is known as a micronutrient that has benefits for plants and helps reducing the negative effects of environmental stressors such as water scarcity, flooding, salinity, and exposure to heavy metals [2]. Among the most widely consumed plant crops worldwide is tomato (<i>Solanum lycopersicum</i> L.). Currently, China leads the world in tomato production, with India, Turkey, USA, Egypt, Iran, and Italy following in that order [3]. In this study, the role of selenium dioxide (SeO₂), as an ameliorant, was investigated on the chlorophyll, carotenoid, proline and soluble sugars content. The explore comprised of 10 treatment: control, Se (5, 10, 25 and 50 µM), NaCl (50 mM) and NaCl + Se (50mM + 5, 10, 25 and 50 µM) to identify the ideal concentration of each solute. Each treatment comprised of three reproduced. The results showed that SeO₂ (25 µM) had an ameliorating effect on salinity and increased proline and soluble sugars contents in the leaves of tomato plants exposed to salt stress (50mM) indicating of the defense mechanism in Redstone variety against high salinity. Salinity stress reduced chlorophyll and carotenoid content. Chlorophyll increased in stressed plants treated with selenium (25 µM).

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Poster Presentation ID: 1300

Physiological response of tomato to salinity and selenium application: focus on water status and biomass accumulation

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ARTICLE INFO	ABSTRACT
Keywords: <i>Solanum lycopersicum</i> Salinity SeO₂ RWC Fresh and dry weight	The saltiness of water system water or agrarian soil is one of the foremost critical impediments to the development and efficiency of plants around the world. As affirmed by Siddiqui et al. [1], half of the worlds watered sources and fifth of the worlds gricultural soil are seriously salinized, causing a critical issue for bolstering the ceaselessly developing world populace. Whereas not fundamental, Selenium (Se) can have physiological benefits to plants, which may be related to its inclination to upregulate plant antioxidant metabolites and enzymes, driving to distant better; a much better;a higher;a stronger;an improved a higher capacity to rummage receptive oxygen species (ROS) that hinder plant execution, particularly beneath stress [2]. Tomatoes (<i>Solanum lycopersicum</i>) are among the foremost commonly developed vegetable natural products around the world, with an yearly around the world generation of over 170 million tons, and are regularly positioned to begin with among vegetable crops [3]. The explore comprised of 10 treatment: control, Se (5, 10, 25 and 50 µM), NaCl (50 mM) and NaCl + Se (50mM + 5, 10, 25 and 50 µM) to identify the ideal concentration of each solute. Selenium dioxide (SeO₂) was utilized as a source of selenium amid the explore. Eeach treatment comprised of three reproduced. In this study, leaf number, fresh and dry weight of shoot and root, shoot and root length, relative water content (RWC) in Karen variety were measured. All these components decreased with expanding saltiness. Selenium made strides the condition of plants beneath saltiness stretch at a concentration of 25 µM Se.

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Poster Presentation ID: 1302

Evaluation of Growth and Phytochemical Performance of *Echinacea purpurea* under Soil Moisture Management Treatments in Rainfed Conditions

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ARTICLE INFO

Keywords:

Plastic mulch
Soil moisture
conservation
Phytochemical
properties

ABSTRACT

Medicinal plants such as *Echinacea purpurea* have attracted global attention due to their therapeutic properties and adaptability to marginal lands. Enhancing their productivity under water-limited conditions is crucial for sustainable agriculture. This study, conducted in 2020 at Takht Mirza, Esfarayen, aimed to investigate the effects of soil moisture conservation treatments on the growth and phytochemical traits of *Echinacea purpurea* under rainfed conditions. The experiment was arranged in a randomized complete block design (RCBD) with four replications. Treatments included plastic mulch, straw mulch, superabsorbent polymer, and plant density adjustments. Results demonstrated that the plastic mulch treatment significantly improved plant height (by 34.2%), fresh and dry weight of shoots (by 42.5%) and roots (by 39.1%), and the number of lateral branches (by 27.6%) compared to the control. These differences were statistically significant ($p < 0.05$). Moreover, plant density optimization positively influenced certain vegetative parameters, although some changes were not statistically significant. Phytochemical analysis revealed higher levels of caffeic acid derivatives and essential oil content in plants treated with plastic mulch, consistent with findings from previous studies that underline the role of environmental conditions on phenolic accumulation. These phytochemical differences were also statistically significant ($p < 0.05$). The study concludes that effective soil moisture management, particularly through plastic mulching, can significantly enhance the growth and secondary metabolite production of *Echinacea purpurea* under rainfed conditions. Considering the low water requirement and high medicinal value of this species, its cultivation in semi-arid and arid regions is highly recommended.

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Poster Presentation ID: 1304

A Randomized Controlled Trial of a Single-Dose of *Psilocybe cubensis* Alkaloid Extract for Posttraumatic Stress Disorder in Veterans

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ARTICLE INFO	ABSTRACT
Keywords: <i>Psilocybe cubensis</i> Psilocybin Posttraumatic stress disorder Veterans	Monoaminergic action of psilocybin makes it a candidate in the treatment of posttraumatic stress disorder (PTSD). In the present work through a randomized double blinded clinical trial, we applied a 20 mg single dose of alkaloids extract of <i>Psilocybe cubensis</i> (PCE) mushroom (n = 22) or placebo (n = 21) on veterans over a 6-week period. The outcome was the change from baseline in the score on the PTSD Checklist for DSM-5 (PCL-V), Hamilton depression rating scale (HAMD), and Beck anxiety inventory (BAI). In the PCL-V, mean score reduction after 6 weeks was 4.9±1.2 in PCE and .23±2.7 in placebo group. The mean changes in the HAMD score from baseline to week 6 were 4.7±1.3 in the PCE group and .95±1.6 in the placebo group. These decreases were 9.4±2.3 in PCE and .33±2.8 in placebo for BAI. Changes in HAMD, BAI and PCL-V scores the support preliminary efficacy of <i>Psilocybe cubensis</i> alkaloids as a novel treatment for PTSD in veterans.

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Poster Presentation ID: 1305

Effects of Naphthaleneacetic Acid (NAA) on Rooting and Growth Characteristics of *Rosmarinus officinalis* L. Cuttings

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ARTICLE INFO	ABSTRACT
Keywords: <i>Rosmarinus officinalis</i> naphthaleneacetic acid (NAA) Rooting induction Vegetative propagation Medicinal plants	Iran's rich and diverse flora is recognized as one of the world's most valuable plant resources, encompassing numerous species with medicinal properties that are highly significant to the pharmaceutical, cosmetic, and food industries. Among these, <i>Rosmarinus officinalis</i> L. (rosemary), a member of the Lamiaceae family, is particularly esteemed due to its high essential oil content and extensive industrial applications. Vegetative propagation of rosemary is favored for commercial production as it ensures the preservation of desirable maternal traits and prevents genetic segregation. The present study aimed to evaluate the effects of different concentrations of 1-Naphthaleneacetic acid (NAA) on the rooting and growth performance of rosemary cuttings. The experiment was conducted in a completely randomized design (CRD) with four treatments and three replications in the greenhouse of the Faculty of Agriculture, Tarbiat Modares University. Treatments comprised four NAA concentrations: 0, 500, 1000, and 1500 mg/L. Cuttings were immersed in the respective NAA solutions for 5 seconds prior to planting under optimal greenhouse conditions. The results demonstrated that increasing NAA concentrations significantly enhanced several growth parameters. Specifically, the shoot fresh weight reached 23.44 g at 1500 mg/L NAA, representing a 25% increase compared to the control. Similarly, the highest shoot dry weight (4.64 g) was recorded at the 1500 mg/L concentration. Although differences in rooting percentage among treatments were not statistically significant, a positive trend was observed, with the highest number of roots per cutting (3.92) and the greatest root length (75.30 mm) achieved under application of 1500 mg/L NAA treatment. These findings are in agreement with previous reports suggesting that NAA concentrations between 1000 and 1500 mg/L can effectively promote rooting and vegetative growth in <i>R. officinalis</i>.

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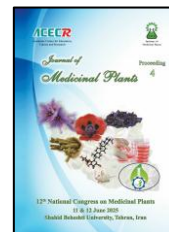
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Poster Presentation ID: 1306

Extraction characterization tetrahydrocannabinol from *Cannabis sativa*

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ARTICLE INFO	ABSTRACT
Keywords: <i>Cannabis sativa</i> Extraction Identified Purification Tetrahydrocannabinol	<i>Cannabis sativa</i> is a good source of tetrahydrocannabinol (Cho, Ryu et al. 2024). Tetrahydrocannabinol, known in the pharmaceutical field as dronabinol, is approved in the United States as a capsule or solution for the relief of chemotherapy-induced nausea and vomiting and anorexia caused by HIV/AIDS (Sera and Hempel-Sanderoff 2025, Valizadeh, Veenhuis et al. 2025). The aim of this research is to extract and purify tetrahydrocannabinol from <i>Cannabis sativa</i> using solid phase extraction technique. This method has distinct advantages compared to extraction methods using organic and aqueous solvents alone. The extracted solvent was neutralized with 1N hydrochloric acid and separated using ethyl acetate using a rotary device until a viscous mixture was formed. One gram of silica gel was added to this mixture and transferred to a 20 cm high silica gel column and another half gram of silica gel was added on top. Then, the column was washed using a mixture of ethyl acetate and petroleum ether in a ratio of 1 to 20. TLC showed the desired tetrahydrocannabinol spots. The resulting solution was left alone and after 24 hours, the crystalline precipitate was separated using filter paper and stored in a dark container for identification steps. The tetrahydrocannabinol was identified using high-performance liquid chromatography-mass spectrometry and proton and carbon nuclear magnetic resonance spectroscopy.

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Poster Presentation ID: 1309

Preparation, Identification and Application of Silica Nanocapsules Containing *Melissa officinalis* Essential Oil as A Pesticide

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ARTICLE INFO	ABSTRACT
Keywords: Pesticide Nanocapsule Silica <i>Melissa officinalis</i> Synthesis	The adverse effects of chemical pesticides, including toxicity, pest resistance, environmental hazards, and public health concerns, have driven interest in plant essential oils as sustainable alternatives. However, their biological instability and poor water solubility under environmental conditions limit their application [1]. To address these challenges, mesoporous silica nanocapsules have emerged as promising carriers to enhance the stability, bioavailability, and pesticidal efficacy of essential oils. <i>Melissa officinalis</i> essential oil, recognized for its natural pesticidal properties, was selected for encapsulation within silica nanocapsules to develop a biocompatible, eco-friendly biopesticide [2,3]. In this study, <i>Melissa officinalis</i> essential oil was extracted via supercritical fluid extraction and characterized using gas chromatography-mass spectrometry (GC-MS). Two encapsulation methods in-situ polymerization and immersion were employed to synthesize silica nanocapsules. Field-emission scanning electron microscopy (FE-SEM) analysis showed that nanocapsules synthesized via the immersion method were smaller and more porous, whereas in-situ polymerization yielded larger, denser structures. Release testing indicated slower essential oil release from immersion-synthesized nanocapsules due to their reduced size and porosity, while in-situ nanocapsules exhibited gradual release with sustained structural integrity. Both types retained over 90% of the encapsulated oil after 90 days, demonstrating their effectiveness in prolonging shelf life and enabling controlled delivery. This study highlights the efficacy of silica nanocapsules in stabilizing <i>Melissa officinalis</i> essential oil and tailoring its release kinetics through scalable synthesis methods. The successful development of these nanocapsules represents a critical advancement toward sustainable, environmentally friendly biopesticides that mitigate contamination risks and align with global agricultural sustainability goals.

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Poster Presentation ID: 1310

Antidermatophytic efficacy of Iranian medicinal plants against important dermatophytes in Iran.

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ARTICLE INFO	ABSTRACT
Keywords: Antifungal activity Iranian herbal plants <i>Artemisia sieberi</i> Essential oil Dermatophytes	Dermatophytes are the most common causative agents of superficial fungal infections in humans and animals. In recent years, the increasing resistance of these organisms to conventional antifungal drugs such as terbinafine, azoles, and griseofulvin has made serious problem in effective treatment. This has led to a growing interest in the use of natural compounds, particularly medicinal plant essential oils, as alternative therapies because of their lower side effects, lower cost, and affordable. This study aimed to evaluate the in vitro antifungal activity of essential oils extracted from nine traditionally used Iranian medicinal plants against five common dermatophyte species: <i>Trichophyton mentagrophytes</i>, <i>T. rubrum</i>, <i>Epidermophyton floccosum</i>, <i>Microsporum gypseum</i> (<i>Nannizzia gypsea</i>), and <i>M. canis</i>. The essential oils were obtained through hydrodistillation from air-dried plant materials. Minimum inhibitory concentrations (MICs) and minimum fungicidal concentrations (MFCs) were determined using the broth microdilution method according to CLSI M38-A guidelines. According to results all tested essential oils exhibited antifungal activity to varying degrees. Among them, <i>Artemisia sieberi</i> demonstrated the strongest antifungal effect with a mean MIC of 0.3 mg/mL, which was significantly lower than other oils ($P < 0.05$) and even comparable to certain synthetic antifungal agents. <i>Cuminum cyminum</i>, <i>Zataria multiflora</i>, and <i>Mentha spicata</i> displayed moderate activity, whereas <i>Nigella sativa</i> and <i>Rosmarinus officinalis</i> showed weaker effects. These findings suggest that the essential oil of <i>A. sieberi</i>, in particular, has considerable potential for topical treatment of dermatophytosis and may use as a natural, effective alternative to chemical antifungal drugs. Further clinical investigations are warranted to validate its efficacy, establish safety profiles, and determine optimal dosages in human subjects.

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Poster Presentation ID: 1311

Investigating Phytochemical and Morphological Diversity in Iranian *Colocynthis* Accessions

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ARTICLE INFO	ABSTRACT
Keywords: Antioxidant Fatty acid Genome source Morphological Phytochemical	In this research project, 17 of accessions of <i>Citrullus colocynthis</i> were collected from various geographical regions throughout Iran and cultivated in an experimental design in a Randomized Complete Block Design with three replications at the Research Station of the Horticultural Sciences Department, Faculty of Agriculture, University of Tehran. After planting and growth completion (including both vegetative and reproductive stages), fully ripe fruits with orange peel were subjected to comprehensive morphological and phytochemical analyses. Phytochemical evaluations included quantification of antioxidant compounds, carotenoids, saturated/unsaturated fatty acids, and phenolic compounds. Analysis of the results, in terms of variance analysis, difference and correlation coefficients of traits, showed good results of the relationships between morphological and phytochemical traits. In terms of morphology, the highest fruit yield per plant (7740 grams) belonged to the Orzoiyeh accessions, and in terms of the highest number of fruits per plant, the Khorasgan 5 accessions came out on top. But the Orzoiyeh accessions, with the highest amount of antioxidant compounds, phenolic compounds (88 mg of Gallic acid per gram of dry weight) and the highest amount of linoleic and linolenic fatty acids with a value of 72.4%, had a high correlation in relation to the appearance of fruit weight with mesocarp diameter ($r = 0.77$). In the cluster analysis of accessions, the Kerman accessions was placed in a cluster due to its high phenolic content compared to other accessions. These results demonstrate considerable phenotypic and phytochemical diversity among Iranian <i>C. colocynthis</i> accessions, highlighting their potential as a valuable genomic resource for cultivation and breeding programs.

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Poster Presentation ID: 1313

Growth Promotion and Biocontrol Potential of Endophytic Bacteria from *Euphorbia* Medicinal Plants Against *Rhizoctonia solani* in Parsley

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ARTICLE INFO

Keywords:

Bacillus subtilis

PCR

Disease severity

Anti-fungal

ABSTRACT

Endophytic bacteria isolated from medicinal plants exhibit the capacity to synthesize a diverse array of secondary metabolites with multiple biological applications, spanning pharmaceutical innovation to sustainable agriculture. Certain endophytic strains demonstrate biocontrol efficacy against phytopathogens through antimicrobial compound production or induction of systemic resistance in plants. *Rhizoctonia solani*, a soil-borne fungal pathogen responsible for seedling damping-off, represents a critical threat to greenhouse and field-grown vegetables, incurring substantial annual crop losses. This study investigated the biocontrol potential of endophytic bacteria isolated from *Euphorbia* medicinal plants against *R. solani* in parsley (*Petroselinum crispum*). Bacterial isolates were screened for antifungal activity and their ability to enhance parsley seed germination and early seedling growth under laboratory conditions. Subsequent greenhouse trials evaluated the effects of the selected strain on the reduction of disease severity and plant growth-promoting. The isolate was identified via 16S rRNA gene sequencing. Among the tested isolates, strain Eu1 exhibited superior antifungal activity and significantly accelerated seed germination. Inoculation with Eu1 increased parsley seedling fresh weight, dry weight, root length, and shoot length by 213%, 194%, 163%, and 253.6%, respectively, compared to untreated controls. Disease severity reduction reached 90% in greenhouse trials. Molecular identification confirmed that the isolate was *Bacillus subtilis*. Findings suggest that *Bacillus subtilis* Eu1 inoculation offers dual benefits: substantial suppression of *R. solani* disease and remarkable growth enhancement in parsley. Implementation of such endophytic inoculants could reduce dependency on synthetic fungicides and fertilizers while improving crop productivity and plant health.

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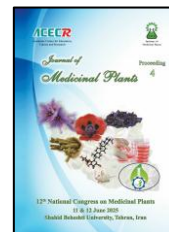
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Poster Presentation ID: 1314

Formulation, Preparation, and Evaluation of a Medicinal Syrup from Pomegranate Peel (*Punica granatum* L.)

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ARTICLE INFO	ABSTRACT
Keywords: Pomegranate peel Antioxidant Gastroprotective effects Breast cancer Ellagic acid	Pomegranate peel, a by-product of <i>Punica granatum</i> L., is rich in bioactive compounds with proven therapeutic properties, including antibacterial, antiparasitic, antioxidant, and anticancer effects. The extract has been shown to reduce the risk of cardiovascular diseases, promote wound healing, and assist in the treatment of hemorrhoids and bronchitis. It also demonstrates gastroprotective properties against damage caused by aspirin and ethanol, primarily due to its antioxidant mechanism. Scientific studies suggest that different parts of the pomegranate plant can inhibit the proliferation of various cancer cell lines. Polyphenols from fermented pomegranate juice have shown cytotoxic effects against breast cancer cells. Additionally, pomegranate seed oil and juice have demonstrated promising anticancer activity in prostate, colon, lung, oral, skin cancers, and leukemia through mechanisms such as antioxidant action, cell proliferation inhibition, anti-angiogenesis, and anti-inflammatory effects. One of the key phytochemicals, ellagic acid, has shown therapeutic potential against several cancers, including pancreatic, bladder, esophageal, liver, and neuroblastoma. In this study, pomegranate peels were dried, powdered, and extracted using the percolation method to obtain an aqueous extract. The extract was concentrated using a rotary evaporator and analyzed for total tannin and flavonoid content to ensure standardization. Three syrup formulations were developed and evaluated based on physicochemical properties such as consistency, color, taste, and compliance with pharmacopoeial standards. Among them, Formulation No. 2 was found to be the most effective. It contains: Aqueous Extract (5 g), Sucralose (60 mg), Citric Acid (150 mg), Methylparaben (100 mg), Potassium Sorbate (100 mg), and Distilled Water (up to 100 mL). Standardization showed that each milliliter of the syrup contains 0.92 mg of total tannin, expressed as gallic acid equivalent. These findings support the development of a stable, effective herbal syrup with potential therapeutic applications.

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Poster Presentation ID: 1315

Formulation, Development, and Evaluation of Effervescent Tablets from Pomegranate Peel (*Punica granatum* L.)

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ARTICLE INFO	ABSTRACT
Keywords: Pomegranate peel Effervescent Tablets Antidiarrheal effects Anthocyanins effects Gram-positive bacteria	<i>Punica granatum</i> L., commonly known as pomegranate and a member of the Punicaceae family, is considered a natural source of phenolic compounds. It contains potent antioxidants such as tannins, polyphenols, flavonoids, and vitamin C. Other antioxidant compounds found in pomegranate include tocopherols and anthocyanins, which have well-documented preventive and therapeutic effects. Traditional medicine suggests that a decoction of dried pomegranate peel can be used for treating various injuries, wounds, and microbial infections—particularly diarrhea. Sweet pomegranates are believed to have mild laxative effects, while less sweet varieties are traditionally used to alleviate gastric inflammation. Scientific studies have shown that pomegranate peel extract demonstrates significant antibacterial activity, especially against Gram-positive bacteria. It has been found effective against methicillin-sensitive and methicillin-resistant <i>Staphylococcus aureus</i>, <i>Escherichia coli</i>, <i>Salmonella typhi</i>, and certain strains of <i>Streptococci</i>. The antidiarrheal effects of pomegranate peel extract are attributed to several mechanisms: (1) increased reabsorption of water and NaCl, (2) reduced mucosal secretion, and (3) inhibition of prostaglandin release from the intestinal mucosa. By decreasing intestinal motility, the extract further enhances the reabsorption process. In this study, effervescent tablets were formulated using the aqueous extract of pomegranate peel. Six different formulations were prepared and evaluated based on pharmacopoeial standards and phytochemical analysis, including total tannin and flavonoid content. Among these, Formulation No. 6 yielded the best results. It contained 0.5% magnesium stearate, 1.05% lactose, 0.7 g citric acid, and 1.2 g of extract loaded onto sodium bicarbonate in a 5:1 ratio. Standardization revealed that each tablet contains 4.602 mg of total tannins, expressed as gallic acid equivalent. These findings support the development of a stable and effective herbal effervescent tablet with potential therapeutic applications, particularly in gastrointestinal and infectious conditions.

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Poster Presentation ID: 1316

Antinociceptive Effect and phytochemical evaluation of the extract of *Ferula persica* gum resin

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ARTICLE INFO

Keywords:

Ferula persica

Gum

Antinociceptive

Phytochemical

Flavonoid

ABSTRACT

Ferula persica Willd. is a native plant of Iran, known for its anti-spasmodic, analgesic, and anti-inflammatory properties in Persian medicine. This study investigated the antinociceptive effects of the oleo-gum-resin extract of *F. persica* in mice, as well as its total phenolic and flavonoid contents. The hydroalcoholic extract of *F. persica* oleo-gum-resin was prepared using the maceration method. Mice were randomly divided into six groups: a normal saline group (negative control), a dimethyl sulfoxide group, three groups receiving different doses of the hydroalcoholic extract (50 mg/kg, 100 mg/kg, and 200 mg/kg), and a sixth group (positive control) receiving Ketoprofen. To assess the analgesic effects of the extract, four tests were conducted: writhing, hot plate, tail flick, and formalin tests. The findings demonstrated that the extract at doses of 50, 100, and 200 mg/kg effectively reduced pain and the analgesic effect was dose dependent. A significant difference was observed between the control and treatment groups across all four tests. The 200 mg/kg dose exhibited the greatest analgesic effect in both the acute and chronic phases of the formalin tests. Some chemical compounds of the gum such as flavonoids may be responsible for its analgesic effect. According to this study, *F. persica* gum extract can alleviate pain caused by thermal and chemical stimuli. These findings support the traditional use of *F. persica* gum in managing painful conditions. Further studies are needed to investigate effectiveness of *F. persica* oleo-gum-resin in pain management and the possible mechanisms of its analgesic effects.

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The Effect of Drying Temperature on Essential Oil Yield and Antioxidant Activity of *Salvia officinalis* L.

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ARTICLE INFO

Keywords:

Medicinal plants

DPPH

Extract

Sage

ABSTRACT

Salvia officinalis L., is a medicinally and economically important plant widely utilized in the pharmaceutical, food, cosmetic and fragrance industries. Given the increasing demand for medicinal plants, identifying optimal post-harvest processing conditions particularly drying temperature is crucial, as it significantly influences the phytochemical profile. This study evaluated the effects of different drying temperatures on the essential oil content and antioxidant capacity of *S. officinalis* extracts using a completely randomised design (CRD). Plants were dried via shade-drying at room temperature (25°C) and in an oven at 40, 50, and 60°C. Essential oils were obtained using hydro-distillation with a Clevenger apparatus for 3 hours. Methanol extracts (80%) were prepared by maceration at 25°C for 24 hours. Antioxidant activity was assessed by DPPH radical inhibition assay. Finally, the statistical analysis of the data was done using SAS software, and the average of the treatments was compared using Duncan's test at 5%. Drying at 40°C increased essential oil yield compared to ambient drying, whereas higher temperatures (50–60°C) led to a decline. Antioxidant activity peaked in samples dried at 25°C (83.51%), with a significant difference compared to other samples; however, drying at 60°C (41.38%) caused a nearly 50% reduction in antioxidant potential (Fig1). According to previous research, these findings suggest that drying at temperatures exceeding 40°C may degrade thermolabile phytochemicals such as volatile oils and phenolic compounds, thereby diminishing the medicinal quality of the plant.

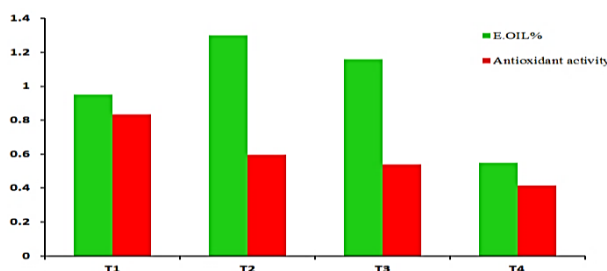


Fig1. Changes in antioxidant activity and E.oil under different drying temperatures

(T₁=25°C, T₂=40°C, T₃=50°C, T₄=60°C)

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Poster Presentation ID: 1319

Ginger (*Zingiber officinale*) extract mitigates the harmful effects of acrylamide on the histomorphological structure of testes

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ARTICLE INFO	ABSTRACT
Keywords: Ginger Acrylamide Histocology Testicular tissue Rat	Acrylamide (ACA) is a common toxic compound found in food and industrial environments that harms male reproductive health by inducing oxidative stress, disrupting hormone balance, and triggering cell death. Natural antioxidants, such as <i>Zingiber officinale</i> (ginger), known for their anti-inflammatory and free radical-scavenging properties, may offer protection against ACA-induced damage to the testes. Ginger (GING), a well-known medicinal plant, exhibits potent antioxidant, anti-inflammatory, and anti-apoptotic activities due to its active ingredients. This study evaluated the protective effects of ginger extract (GING) on testicular tissue alterations in rats treated with ACA. Thirty-two male Sprague-Dawley rats were assigned to four groups (n=8 each): control (untreated), ACA (10 mg/kg, oral gavage), GING (200 mg/kg, oral gavage), and ACA+GING (combined treatment). After 52 days, the testes of each rat were preserved in 10% neutral-buffered formalin for histomorphometric analysis. The number of Leydig cells in the GING-treated groups returned to levels similar to those observed in the healthy control group. Additionally, Johnsen's score for the seminiferous tubules in the testis showed a significant increase in the groups receiving GING compared to the ACA group ($p < 0.05$). The Johnsen's scoring system in the ACA group recorded a mean score of 7.3 ± 0.28, the lowest among all study groups ($p < 0.05$). This study demonstrated that ginger (<i>Zingiber officinale</i>) extract (200 mg/kg) effectively mitigates acrylamide-induced testicular toxicity by improving the histomorphometric structure of the testis.

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Poster Presentation ID: 1320

Overcoming gametophytic self-incompatibility in *Rosa damascena* Mill. through exogenous ethephon application

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ARTICLE INFO

Keywords:

Rosa damascena

Ethephon

Ethylene

Self-incompatibility

Gametophytic

ABSTRACT

Gametophytic self-incompatibility (GSI) in *Rosa damascena* Mill. represents a significant barrier to seed production via self/cross pollination. This limitation affects genetic variability and hinders breeding efforts. This study explored the potential of ethephon (2-chloroethylphosphonic acid), a well-known ethylene-releasing compound, to mitigate self-incompatibility and improve reproductive outcomes in two *R. damascena* genotypes (Fars and Tehran) over two consecutive growing seasons. A randomized complete block design with three replicates was employed. In the first year, ethephon was applied at concentrations of 5 and 10 mM. In the second year, treatments included 2.5, 5, and 7.5 mM, delivered through three methods: foliar spraying, floral immersion, and double pollination. The findings highlighted ethephon's remarkable efficacy in promoting fruit set, with the 'Tehran' genotype exhibiting superior performance in several reproductive traits. Significant genotypic differences were observed in the first year, particularly affecting total seed number, hip weight, width, and length ($p < 0.05$). In the second year, double pollination led to substantial increases in fresh seed weight and total seed count ($p < 0.01$), while immersion treatments significantly enhanced seed number and hip length ($p < 0.05$). The results suggest that ethylene released from ethephon may facilitate pollen tube growth and successful fertilization by modulating key physiological and biochemical processes. This includes the suppression of S-RNase activity, regulation of calcium signaling, reorganization of actin filaments, and reduction of structural barriers like callose. Additionally, ethylene may contribute to reproductive success by downregulating inhibitory components of the signaling cascade, such as CTR1. In overall, these findings provide compelling evidence for the practical utility of ethephon in overcoming GSI in *R. damascena*. This ethylene-mediated approach offers a novel and promising avenue for enhancing seed production in damask rose breeding.

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Poster Presentation ID: 1321

Effects of Arbuscular Mycorrhizal Fungi and Plant Growth-Promoting Rhizobacteria on Soil Microbial Indices, Shoot Nutrient Content, and Shoot Dry Weight of *Borago officinalis* under Cadmium Stress

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ARTICLE INFO

Keywords:

Biofertilizers

Borago officinalis

Carbon availability
index

Shoot dry weight

Shoot nitrogen

ABSTRACT

To investigate the role of biofertilizers, including arbuscular mycorrhizal fungi and plant growth-promoting rhizobacteria (PGPR) of the genus *Pseudomonas*, in enhancing the cadmium (Cd) stress tolerance of borage (*Borago officinalis* L.), a greenhouse experiment was conducted in 2020 at the Faculty of Agriculture, Yasouj University. The experiment was arranged as a factorial based on a completely randomized design with three replications and a total of 16 treatments. The experimental factors included four levels of biofertilizer application (no inoculation, inoculation with *Funneliformis mosaeae* fungi, inoculation with *Pseudomonas putida* + *Pseudomonas fluorescens*, and co-inoculation of fungi and bacteria) and four levels of cadmium concentration (0, 25, 50, and 75 mg Cd kg⁻¹ soil). The results indicated that the highest basal microbial respiration (441.96 µg C g⁻¹ soil) was recorded in the treatment without cadmium combined with co-application of biofertilizers, representing a 2.36-fold increase compared to the lowest value observed under 75 mg Cd kg⁻¹ soil without biofertilizer application. Application of the highest cadmium concentration reduced substrate-induced respiration and the carbon availability index by 44.12% and 27.75%, respectively. Conversely, co-inoculation with mycorrhizal and PGPR improved these traits by 12.74% and 61.57%, respectively, compared to the control. Furthermore, the lowest nitrogen (12.92 mg g⁻¹) and phosphorus (7.41 mg g⁻¹) contents in the shoot were observed under the 75 mg Cd kg⁻¹ soil + no biofertilizer treatment, whereas co-application of biofertilizers under non-stress conditions resulted in 1.04- and 1.26-fold increases in these elements, respectively. Ultimately, inoculation with mycorrhizal and PGPR led to the highest shoot dry weight at all cadmium application levels, with the maximum observed under non-stress conditions and the minimum under 75 mg Cd kg⁻¹ soil. The findings demonstrated that the application of mycorrhizal and PGPR could mitigate cadmium-induced physiological damages in borage and support the continuation of plant growth under Cd stress.



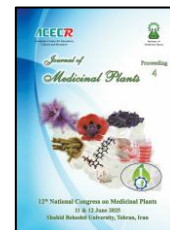
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Poster Presentation ID: 1322

Botanical Modulation of Hydroquinone Activity: Anti-Melanogenic Cream Formulation Utilizing Morus Leaf Phytoconstituents

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ARTICLE INFO

Keywords:

Morus nigra

Morus alba

Hydroquinone

Hyperpigmentation

Stability

ABSTRACT

While not life-threatening, hyperpigmentation significantly impairs patients' quality of life due to its undesirable aesthetic effects. This condition adversely affects various aspects of life, including social interactions, recreational activities, and mental health. A key therapeutic approach involves inhibiting tyrosinase activity. Hydroquinone, one of the most effective compounds in anti-pigmentation products, acts as a suppressor of this enzyme. However, its use is associated with multiple side effects, such as skin irritation, contact dermatitis, melanocyte toxicity, and depigmentation. In this context, medicinal plants such as *Morus nigra* and *Morus alba* leaves have shown promise as tyrosinase inhibitors. This study aimed to formulate anti-hyperpigmentation creams containing ethanolic extracts of *M. nigra* and *M. alba* leaves (either alone or in combination with hydroquinone) and evaluate their stability and safety. The extracts were obtained through maceration using 80% ethanol, standardized by measuring total phenolic content (TPC) using spectrophotometry, and incorporated into three vanishing cream formulations (extract, extract+hydroquinone, and base creams). The stability of the formulations was assessed under conditions of rotational shear stress and thermal fluctuations (between 4 and 40°C), with parameters such as homogeneity and phase separation evaluated. Additionally, skin sensitization tests were conducted using a rabbit model (white albino). The extraction yields were 10.5% for *M. nigra* and 9.8% for *M. alba*. The TPC values of the extracts were 3.80 mg/ml and 3.94 mg/ml, respectively. Stability results demonstrated that all formulations exhibited optimal stability with no significant change in TPC (extract cream: 0.864→0.739 mg/ml; extract+hydroquinone cream: 1.55→1.312 mg/ml) and no phase separation. No allergic reactions were observed at 72 hours, 7 days, or 14 days post-application in groups treated with either the extract-containing creams or the extract-hydroquinone combination. These findings suggest that the anti-pigmentation creams formulated with the extracts (either alone or combined with hydroquinone) exhibit favorable physical stability and safety profiles, with no sensitization potential. (Ethical Code: IR.ABZUMS.REC.1400.210)

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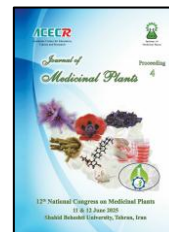
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Poster Presentation ID: 1323

The Effects of Mycorrhizal Fungi on Some Phytochemical Compounds in Ethanolic and Acetonic Extracts of *Teucrium polium* L.

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ARTICLE INFO	ABSTRACT
Keywords: Mycorrhiza Solvent <i>Teucrium polium</i> L. Phytochemicals Organic	<i>Teucrium polium</i> L., a medicinal plant belonging to the Lamiaceae family, possesses notable antifungal, antibacterial, and antioxidant properties, primarily attributed to its rich content of terpenoids and polyphenols. The application of biofertilizers, such as mycorrhizal fungi, has been recognized as an effective approach for enhancing the concentration of active constituents in medicinal plants and for supporting organic agricultural practices. In the present study, conducted at Danesh Alborz University in the year 1403 (2024–2025), the effect of the mycorrhizal fungus <i>Glomus mosseae</i> on the anthocyanin and total phenolic content of <i>T. polium</i> L. was evaluated. The analysis was carried out using SPSS software, and significance was assessed at the 0.05 level. Two types of extracts—acetonic and ethanolic—were examined. The results indicated that inoculation with <i>G. mosseae</i> significantly enhanced the accumulation of anthocyanins and polyphenols, with the ethanolic extracts exhibiting higher concentrations than the acetonic ones. These findings suggest that optimizing solvent selection and concentration, in combination with the application of biological fertilizers such as mycorrhizal fungi, can effectively increase the levels of pharmacologically active secondary metabolites in medicinal plants like <i>T. polium</i> L., thereby promoting the production of high-quality organic herbal products.

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Poster Presentation ID: 1324

Interactive effects of silicon and arbuscular mycorrhiza on growth, antioxidant potential, and secondary metabolites of licorice under water-deficit stress

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ARTICLE INFO	ABSTRACT
Keywords: <i>Claroiedoglomus etunicatum</i> Drought stress Glycyrrhizic acid Licorice Polyphenols	Exogenous application of silicon (Si) and arbuscular mycorrhizal fungi (AMF) can help plants cope with drought stress. An experiment was designed with two Si solute levels in irrigation water (i.e., 0 (Si₀) and 300 mg/pot (Si₁)), two levels of AMF inoculation (i.e., inoculation with <i>Claroiedoglomus etunicatum</i> (F₁) and without inoculation (F₀)), and five soil moisture regimes (i.e., 100, 80, 60, 40, and 20% of field capacity (FC)). The impacts of Si and AMF were assessed on licorice yield, mineral uptake, antioxidant potential, and secondary metabolites under water-deficit stress. After two months, the plants were harvested and their morphological traits were measured. Under water deficit conditions, there were significant decreases in root length, diameter, and dry weight (DW) ($p < 0.05$), compared to the control. Si and AMF could significantly ($p < 0.05$) enhance root area (47.75-150.64 cm²) under all irrigation levels. The maximum glycyrrhizic acid (GA) (26.62 mg/g DW) was achieved by the interaction between Si and AMF in response to 40% FC. A reduction in total flavonoids and phenolics of licorice was observed under severe drought levels; however, the Si and AMF acted to increase sinapic acid (16.46 mg/g DW) and trans ferulic acid (1.11 mg/g DW) in roots. The results indicated that the interaction between Si and AMF positively affected nitrogen (N) and phosphorus (P) concentrations in roots (53.51 and 74.07 %, respectively). At low irrigation levels, the concentrations of P and Si elements increased significantly in the roots. Also, there was an increase in potassium concentration (K) in response to 100, 80, and 40% FC among Si-treated plants (38.5-44.7%). In conclusion, the exogenous application of Si and AMF showed a synergistic impact on the ability to mitigate the adverse effects of drought stress by improving plant growth and enhancing metabolite accumulation in licorice.

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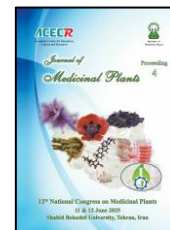
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Poster Presentation ID: 1326

Silymarin Diversity in Wild Populations of Milk Thistle (*Silybum marianum* L.) from Natural Habitats of Iran

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ARTICLE INFO	ABSTRACT
Keywords: Marian thistle Silybin Chemotyping Chemotaxonomy Phytochemical Diversity	Milk thistle (<i>Silybum marianum</i> (L.) Gaertn.) from the <i>Asteraceae</i> family is an important medicinal plant belonging to the Mediterranean flora. The medicinal properties of this species are mainly due to silymarin, a combination of different flavonolignans found in the fruit. Wild populations of milk thistle in the world can consist of individuals with the same chemotype, or heterogeneous mixtures of individuals with different chemotypes. So far, only three chemotypes (A, B, and C) have been identified among wild populations in the world. Chemotypes are very stable and show strong genetic control over the silymarin biosynthetic pathway. In the present study, the silymarin chemotype and content of 18 different wild populations of milk thistle collected from different regions of Iran were analyzed at the population (Bulk) level. Only 1 pure chemotype (B) was identified among the studied populations, and the rest of the populations were actually heterogeneous mixtures with different proportions of chemotypes A and B. The amount of silymarin varied between 21.87 and 47.94 (with an average of 32.68) mg/g dry wt. ⁻¹ . The results showed that the highest amount of fruit silymarin was related to populations 23 (47.94 mg/g), 34 (42.51 mg/g), 19 (40.48 mg/g) mg/g dry wt. ⁻¹ , and the lowest amount was related to populations 21 (21.87 mg/g), 24 (24.63 mg/g), 17 (25.41 mg/g) mg/g dry wt. ⁻¹ , respectively. Also, in another experiment conducted to better understand chemotypes at single plant level, chemotype and silymarin content were evaluated in 16 single plants from 4 populations in order to check that the mix populations are composed of chemotypes A, B and C. Chemotypes A and B were present in all analyzed regions and no clear correlation was found between chemotypes and geographical features. Also, we observed 4 single plants with a different new chemotype (chem. D) for the first time.

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Poster Presentation ID: 1327

Extraction of red pigment from safflower and its encapsulation to increase stability

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ARTICLE INFO

Keywords:

Carthamus tinctorius

Carthamine

Encapsulation

Red pigment

ABSTRACT

Carthamine, a natural pigment from *Carthamus tinctorius*, is widely utilized in the pharmaceutical and dye industries {1}. This study aimed to extract the red pigment from safflower and stabilize it through encapsulation techniques. The extraction process involved removal of the yellow pigment carthamidin in first and followed by extraction of Carthamine using a sodium carbonate solution. Due to the high sensitivity of Carthamine, the extracted compound rapidly degraded under laboratory conditions, leading to a noticeable loss of color {2}. To overcome this challenge, cellulose was incorporated to form a Carthamine-cellulose complex, intended to enhance pigment stability. Comprehensive analyses using UV-Vis spectroscopy, FTIR and HPLC were conducted to assess the outcomes. Findings revealed that the carthamine-cellulose complex (CCC) significantly improved carthamine stability, attributed to the formation of hydrogen bonds between carthamine and the hydroxyl groups of cellulose, which restricted molecular rotation. Notably, the stabilized pigment demonstrated minimal degradation over a six-month period under laboratory conditions and maintained its recognizable color even at elevated pH levels up to 8.

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Poster Presentation ID: 1328

In Vitro Evaluation of the Antitumor Potential of *Artemisia absinthium* in Colorectal Cancer Cells

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ARTICLE INFO

Keywords:

Artemisia absinthium

Colorectal cancers

SRB assay

Extraction

Cytotoxicity

ABSTRACT

Colorectal cancer (CRC) is one of the most prevalent malignancies and ranks as the third leading cause of cancer-related mortality, especially in developed countries¹. Although surgery and chemotherapy remain the mainstay of treatment, their limitations, particularly adverse side effects and drug resistance, highlight the urgent need for safer and more effective alternatives. Medicinal plants, from which nearly 50% of current chemotherapeutics are derived, are considered promising sources of novel anticancer agents². *Artemisia absinthium* is a medicinal plant known for its various pharmacological activities, including antimicrobial, antiparasitic, antioxidant, and antitumor effects³. In this study, the antitumor potential of three types of extracts infusion (I), decoction (D), and hydroalcoholic (EtOH80%) from the aerial parts of *A. absinthium* was investigated. The cytotoxic effects of the extracts were evaluated in vitro using WiDr human colorectal cancer cells and CCD-841 normal colon epithelial cells. Sulforhodamine B (SRB) assay was employed to quantify cell viability by measuring cell mass, with treatments conducted at concentrations of (0.05, 0.1, 0.25, 0.5, and 1) mg/mL. The extracts were applied for 24, 48, and 72 hours to determine both time- and dose-dependent responses. Results showed that the hydroalcoholic extract showed the most significant effect, especially after 48 hours of treatment. Notably, this extract demonstrated selective toxicity, reducing the viability of cancer cells while sparing normal cells. These findings suggest that *A. absinthium*, particularly in its hydroalcoholic form, holds promise as a potential source for developing novel therapeutic agents targeting colorectal cancer.

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Poster Presentation ID: 1329

Isolation and identification of compounds from extract of *Apium graveolens*

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ARTICLE INFO

Keywords:

Apium graveolens

Celery

Diosmetin

Chrysoeriol

ABSTRACT

Celery also known as *Apium graveolens* is an herbaceous, biennial plant from Umbelliferae family. Various effects have been seen from celery in traditional medicine and with its antioxidants activity it can be helpful in prevention of cancer. Due to the numerous side effects of using synthetic drugs, in the last decade, much attention has been paid to the use of herbal medicine. *Apium graveolens* was collected from apothecary in Tehran. The seeds of the plant were dried, grounded and extracted by methanol 80%. The whole extract was fractionated by hexane, chloroform, ethyl acetate and methanol. Compounds were isolated and identified by different chromatographic and spectroscopic method. Eight pure compounds were isolated from methanol fraction which from our previous study showed the best anti-inflammatory effect which three of them were identified by ¹H-NMR and UV spectroscopy. The three compounds were 3,5,4'-trihydroxy flavone, Chrysoeriol-7-O-glucoside and Diosmetin-7-O-glucoside which belong to flavonoids. Antioxidant, anti-inflammatory, antibacterial and many other effects have been seen from these compounds which explains the numerous effect of *Apium graveolens*. Although these effects may be also a synergistic effect of other compounds of this plant.

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Poster Presentation ID: 1332

Isolation and Characterization of Ginger-Derived Extracellular Vesicles (*Zingiber officinale*)

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ARTICLE INFO

Keywords:

Plant-derived
extracellular vesicles
Ginger-derived
extracellular vesicles
Characterizations

ABSTRACT

Plant-derived extracellular vesicles (PDEVs) represent a class of extracellular vesicles (EVs), which are a diverse group of lipid bilayer membrane vesicles released by plant cells. These vesicles are involved in intercellular communication and the transport of various biological cargoes, including lipids, nucleic acids, and proteins. Recent interest in PDEVs has surged due to their biocompatibility, scalability, and therapeutic potential. Ginger-derived extracellular vesicles (GDEVs) were first isolated from ginger in 2014 using a combination of centrifugation and sucrose gradient methods. Today, various methods are used to extract plant extracellular vesicles, including sucrose gradient ultracentrifugation (sgUC), membrane filtration (MF), PEG-based precipitation, and commercial kits. In this study, fresh ginger rhizomes were washed with water, peeled, and juiced. To remove fibers, debris, and large particles, the juice was sequentially centrifuged at $2,000 \times g$ for 10 minutes, $3,000 \times g$ for 20 minutes, and $10,000 \times g$ for 45 minutes. The supernatant obtained after the final centrifugation was collected, and ginger-derived vesicles were isolated using the Exosome Isolation Kit. The isolated vesicles were characterized by scanning electron microscopy (SEM) and dynamic light scattering (DLS). SEM analysis revealed vesicles with spherical morphology and a size range of approximately 100–400 nm. This observation was further confirmed by DLS, which showed an average particle size of 431.8 ± 165.0 nm and a z-average of 525.9 nm. In addition, the total protein content of the vesicles was measured using the BCA assay, revealing a protein concentration of 2305 $\mu\text{g/mL}$. The successfully isolated vesicles serve as a foundation for our upcoming studies on their functional and therapeutic potential.

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Poster Presentation ID: 1333

Identification of Promising Medicinal Plant Species for Cultivation in the Rainfed Lands of Mazandaran Province, Iran

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ARTICLE INFO	ABSTRACT
Keywords: Medicinal Plant Species Cultivation Rainfed Lands	 Due to the climate change effects, water scarcity, and the inefficiency of many rain-fed farmlands for cereal production, the cropping pattern shift has become indispensable in Mazandaran province of Iran. It should be noted that perennial medicinal plants, which are also drought-resistant, have high economic value, and require less water than conventional crops. Hence, they could be considered as sustainable and economically viable alternatives for these lands. In this way, present study aimed to identify promising medicinal plant species for cultivation in the rain-fed areas of Mazandaran province of Iran based on the expert opinions and market demand. A purposive sampling method was employed and 15 specialists and experts in the field of medicinal plants were selected throughout the province, ensuring a targeted and informed selection process. Data were collected through semi-structured interviews and analyzed using content analysis and MAXQDA_{V24.4.1} software. According to the findings, thyme (<i>Thymus</i> spp.), saffron (<i>Crocus sativus</i> L.), and damask rose (<i>Rosa damascena</i> Mill.) were the top three prioritized species, and borage (<i>Echium amoenum</i>) and rosemary (<i>Rosmarinus officinalis</i>) were also ranked highly. These medicinal plants were selected due to their adaptability to rain-fed conditions, market demand, and their potential for value-added processing such as drying, packaging, and extraction. The results of this study can serve as a valuable resource for policymakers and agricultural planners leading to the development of sustainable agricultural practices in the region. Moreover, the cultivation of these plants can significantly contribute to improving the livelihoods of local farmers, conserving natural resources, and generating rural employment opportunities.



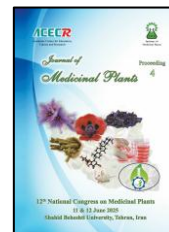
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Poster Presentation ID: 1334

Enhancing Antioxidant Capacity of *Rosmarinus officinalis* Extracts through Optimized Propylene Glycol-Assisted Extraction Using Box- Behnken Design

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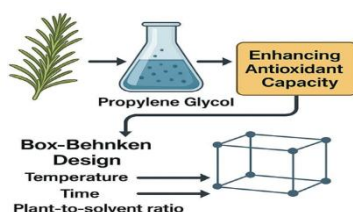
ARTICLE INFO

Keywords:

Rosmarinus officinalis
Propylene glycol
Antioxidant capacity
Extraction optimization
Box-Behnken design

ABSTRACT

This study was conducted to optimize the extraction of antioxidant compounds from *Rosmarinus officinalis* utilizing propylene glycol as a green solvent, through the application of a Box–Behnken experimental design. The influence of critical process parameters, namely solvent concentration, extraction temperature, extraction time, and solid-to-liquid ratio, on the antioxidant yield was systematically evaluated. Antioxidant activity of the extracts was quantified using the DPPH radical scavenging assay. A second-order polynomial model was developed, and analysis of variance (ANOVA) confirmed the statistical significance of all independent variables ($p < 0.05$). Optimization predicted that the maximum antioxidant capacity could be achieved at 50°C, 45 minutes, a solid-to-liquid ratio of 1:20 (w/v), and 60% (v/v) propylene glycol concentration. Experimental validation under these conditions closely matched the predicted values, indicating the model's robustness and reliability. These findings highlight the potential of *Rosmarinus officinalis* as a valuable source of natural antioxidants for medicinal applications, and demonstrate the efficacy of propylene glycol-assisted extraction in green pharmaceutical processes.



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Poster Presentation ID: 1335

Preparation of a magnetic hydrogel as a carrier for targeted drug delivery systems

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ARTICLE INFO

Keywords:

Targeted Drug
Delivery
Hydrogel
*Alyssum
homolocarpum*

ABSTRACT

Targeted drug delivery minimizes the harm to healthy cells, providing opportunities for active targeting of the intended site in the body and sustained drug release [1]. Hydrogels are biomaterial-based polymers of natural origin that play a critical role in drug delivery systems. They are regarded as safe materials with high swelling properties towards water, which are the primary reasons for their reputation [2]. In this study, *Alyssum homolocarpum* seed was selected to prepare a hydrogel. Then, Fe₃O₄ nanoparticles were synthesized and anchored on the surface of carboxymethylated-hydrogel to prepare a magnetic drug carrier. FT-IR and XRD analyses (Figures 1 and 2) confirmed the stepwise synthesis of hydrogel, carboxymethylated-hydrogel, Fe₃O₄, and magnetic carrier. This carrier can be utilized for targeted delivery of pharmaceuticals, especially anti-cancer therapeutics, genes, and other medications to ensure high therapy efficacy by providing the appropriate dosage in the specific sites and reducing potential side effects.

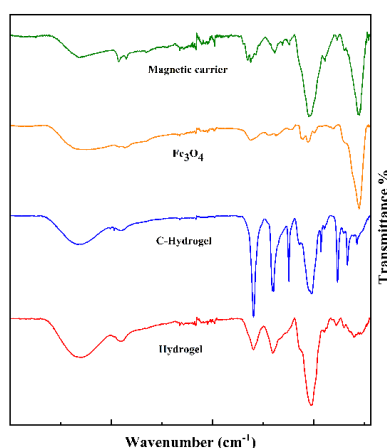


Figure 1. FT-IR analysis.

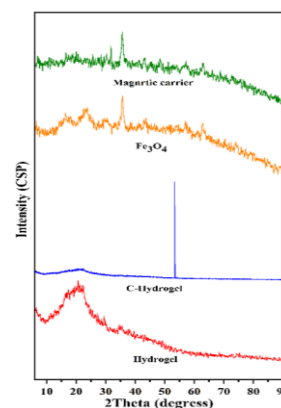


Figure 2. XRD analysis.

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Poster Presentation ID: 1336

Effect of Walnut Leaf and Green Husk Extracts on Chlorophyll Content of Sweet Basil (*Ocimum basilicum* L.) Under Chilling Stress

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ARTICLE INFO

Keywords:

Sweet Basil
Chilling Stress
Walnut Extracts
Chlorophyll Content

ABSTRACT

Sweet basil (*Ocimum basilicum* L.) is widely valued for its culinary and medicinal applications. However, this plant species exhibits a high degree of susceptibility to chilling stress when exposed to temperatures below 10°C. Chilling stress impairs growth, reduces chlorophyll content, and compromises plant quality by causing oxidative damage and disrupting photosynthesis. Natural biostimulants, plant-derived substances that enhance stress resilience, are gaining interest as potential solutions. Walnut (*Juglans regia* L.) leaf and green husk extracts, which are abundant in phenolics, flavonoids, and juglone, have been shown to possess antioxidant properties that could counteract oxidative stress. This study aims to investigate the potential of the foliar application of walnut extracts to enhance basil's (*Ocimum basilicum* L.) tolerance to chilling stress, focusing on chlorophyll content as a key indicator of photosynthetic health. Chilling stress has been demonstrated to trigger the accumulation of reactive oxygen species (ROS) in basil, resulting in cellular damage and chlorophyll degradation. Studies indicate that the antioxidants in walnut extracts can effectively scavenge ROS, thereby mitigating cellular damage. These findings highlight the potential of plant-derived compounds in mitigating aboveground stresses. The experiment involved two treatment groups: Group 1 received walnut leaf extracts at concentrations of 20%, 40%, 60%, and 80%; Group 2 received walnut green husk extracts at concentrations of 30%, 50%, 70%, and 90%. The basil plants were subjected to chilling stress, and chlorophyll content was measured to assess photosynthetic health. The results demonstrated that walnut leaf extracts at 40% (WL40) and 80% (WL80) significantly augmented chlorophyll content in comparison to the control and other treatments ($p < 0.01$), signifying enhanced stress tolerance. In contrast, walnut green husk extracts at 50% to 90% concentrations reduced chlorophyll synthesis, indicating phytotoxicity at higher levels. These findings underscore the potential of WL40 and WL80 as effective biostimulants for enhancing basil's photosynthetic efficiency under chilling stress. This study proposes a novel methodology involving the utilization of walnut-derived extracts as biostimulants to augment sweet basil's capacity for chilling tolerance. By emphasizing chlorophyll retention, it underscores the potential of walnut leaf extracts for agricultural applications, offering a sustainable strategy to improve crop resilience. Further research is needed to optimize extract formulations and explore their broader applicability in stress-prone crops.

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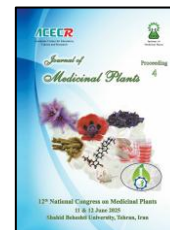
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Poster Presentation ID: 1337

Efficacy of Oral Administration of Ajwain (*Trachyspermum ammi*) Essential Oil on Imiquimod-induced Psoriasis in Animal Model

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ARTICLE INFO	ABSTRACT
Keywords: <i>Trachyspermum ammi</i> Psoriasis Imiquimod-induced model Inflammatory Cytokines Oral administration	Psoriasis is a chronic autoimmune disease associated with systemic inflammation (1). Given the adverse effects of current treatments, finding safer substances that alleviate inflammation is important (2). This experimental study investigated the anti-inflammatory effect of <i>Trachyspermum ammi</i> (Ajwain) essential oil on an Imiquimod-induced psoriasis model in C57BL/6 mice. Imiquimod was administered topically for seven consecutive days on the shaved skin of mice to induce psoriasis. The essential oil was extracted using the hydrodistillation method and analyzed for its total phenolic content. The study included six groups of mice: three receiving different doses of <i>T. ammi</i> essential oil (100, 250, and 500 mg/kg p.o.) and three control groups [no intervention, disease control, and positive control (5 mg/kg dexamethasone p.o.)]. Each group's preparation was administered orally during the final three days of the study. Outcomes included serum pro-inflammatory cytokines (TNF-α, IFN-γ, IL-17A, IL-6, IL-1β), measured by ELISA. Spleen weight and epithelial thickness were also measured. Results showed a significant reduction in inflammatory cytokines (TNF-α, IFN-γ, IL-17A, IL-6, IL-1β) at higher doses, comparable to dexamethasone. A dose-response pattern was observed. However, spleen weight and epithelial thickness did not show significant differences between groups. Overall, the results of this study suggest the potential of Ajwain essential oil as a complementary oral treatment for psoriasis. Future studies are recommended to further explore its anti-inflammatory mechanisms and its ability to reduce corticosteroid dosage requirements. Additionally, investigating its long-term effects and clinical efficacy is recommended.

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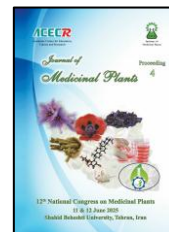
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Poster Presentation ID: 1339

Synthesis and Comparison of Doxorubicin-Loaded Bovine Serum Albumin Nanoparticles for Drug Delivery Efficiency

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ARTICLE INFO	ABSTRACT
Keywords: Doxorubicin Serum Albumin Nanoparticles Chitosan Drug Delivery	This study compares the drug delivery efficiency of doxorubicin-loaded bovine serum albumin nanoparticles with and without chitosan surface coating, aiming to elucidate the role of chitosan in enhancing nanoparticle stability, surface charge, and controlled drug release for improved cancer therapy. BSA and BSA-DOX nanoparticles were synthesized using the desolvation method. BSA and doxorubicin were dissolved in water, and pH was adjusted to 7.5–8.5. Ethanol was gradually added to induce nanoparticle formation, followed by stabilization with 8% glutaraldehyde for 12–24 hours. Ethanol was removed using rotary evaporation. To prepare chitosan-coated nanoparticles (BSA-CS and BSA-CS-DOX), uncoated nanoparticles were added to a chitosan solution (0.2% acetic acid) and purified by centrifugation. Nanoparticles were freeze-dried for 24 hours and characterized for particle size. The nanoparticles exhibited particle sizes around 100 nm, suggesting their potential for efficient drug delivery in cancer therapy.

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Poster Presentation ID: 1340

Chemical constituents of the essential oils of *Origanum* species

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ARTICLE INFO	ABSTRACT
Keywords: <i>Origanum vulgare</i> L. <i>Origanum majorana</i> L. Chemical components	<i>Origanum</i> L. is one of the most popular aromatic herbs of Lamiaceae family and is characterized by a wide range of volatile secondary metabolites which are widely used in food, pharmaceutical and cosmetic industries as a culinary herb, flavoring matters of beverages and food products, preserve food, as well as in perfumery because of their spicy fragrance. <i>Origanum</i> species are traditionally used as sedative, diuretic, sweater and antiseptic [1,2]. Marjoram (<i>Origanum majorana</i>) originates from the eastern Mediterranean, whereas oregano (<i>O. vulgare</i> L.) occurs naturally in most of Eurasia and both are perennial species [3]. The aim of this study was to identify of the chemical components of oregano (<i>O. vulgare</i>) and marjoram (<i>O. majorana</i>) cultivated from Iran. The composition of essential oils from two <i>Origanum</i> species <i>O. vulgare</i> and <i>O. majorana</i> collected from Isfahan province. The essential oil was extracted by a Clevenger approach and analyzed using GC/MS. According to the results, the essential oil content 0.08% for <i>O. vulgare</i> and 1.01% for <i>O. majorana</i>. In total, 33 and 27 compounds were identified in the essential oil from the aerial parts <i>O. vulgare</i> and <i>O. majorana</i>, respectively. The results obtained in our study indicated that the major components in the oil <i>O. vulgare</i> were (E)-β-caryophyllene (18.89%), caryophyllene oxide (10.36%), germacrene D (7.28%), β-bisabolene (5.26%), terpinolene-4-ol (4.13%), <i>p</i>-cymene (3.21%) and carvacrol (2.81%). The major constituents of the oil <i>O. majorana</i> were terpinolene-4-ol (17.54%), trans sabinene hydrate (15.68%), δ-terpinene (9.39%), α-terpineol (6.38%), sabinene (4.89%), linalool (4.26%) and trans-caryophyllene (2.29%).

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Poster Presentation ID: 1341

Chemical constituents of the essential oils of lemon balm (*Melissa officinalis* L.) from Iran

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ARTICLE INFO	ABSTRACT
Keywords: <i>Melissa officinalis</i> L Essential oil Chemical components	<i>Melissa officinalis</i> L. (Lamiaceae) also known as lemon balm, is an aromatic perennial herb native to the East Mediterranean region, West Asia, and North Africa which is a well-known herb for treating many disorders such as headaches, gastrointestinal diseases, neurological diseases, and rheumatoid arthritis [1,2]. This study aimed to identify chemical composition of four genotypes of lemon balm cultivated in Iran. The aerial parts of lemon balm plants were collected during the full flowering stage from four provinces of Iran including Isfahan, Tehran, Chaharmahal Bakhtiari and Alborz Provinces. The essential oil was obtained by steam distillation with a Clevenger apparatus. The characterization of the essential oils was done by gas chromatography–mass spectrometry (GC/MS). The average essential oil content was 0.02 to 0.23% (w/w). Results indicated that the major essential oil constituents of the Tehran genotype were citronellal (12.8%), β-Caryophyllene (8.1%), citronellol (6.9%), and linalool (6.5%). The major constituents of the Alborz genotype were Trans-carveol (27.13%), citronellol (24.37%), δ-3-Cavene (7.56%), and linalool (5.89%). The major constituents of the Chaharmahal Bakhtiari genotype were β-caryophyllene (25.65%), Z-citral (16.47%), E-citral (15.24%), and caryophyllene oxide (11.45%). The major constituents of the Isfahan genotype were β-caryophyllene (21.45%), E-citral (18.42%), Z-citral (14.87%), and germacrene D (10.35%). Differences in the volatile composition of the plant material could be attributed to the growth and many factors of genetic, environmental and their interaction effects.

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Poster Presentation ID: 1342

Bioinformatic Investigation of Phenolic Oxidative Coupling Protein 1 in *Hypericum perforatum*

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ARTICLE INFO	ABSTRACT
Keywords: Bioinformatics Conserved domain Hypericin <i>Hypericum perforatum</i> Phenolic oxidative coupling protein 1	<i>Hypericum perforatum</i> , commonly known as St. John's Wort, belongs to the Hypericaceae family and is recognized worldwide as a valuable medicinal plant due to its active compounds, hypericin and hyperforin (Shafaei et al., 2023). Hypericin in <i>H. perforatum</i> has various pharmacological properties, including antidepressant and antiviral effects (Katzung, 2018). Although the biosynthesis of hypericin in this plant is not fully understood, it is believed that Phenolic oxidative coupling protein 1 plays a crucial role in the final stages of hypericin biosynthesis (Košuth et al., 2010). Therefore, in this research, Phenolic oxidative coupling protein 1 was studied in <i>H. perforatum</i> based on bioinformatics databases such as NCBI, UniProt, and InterPro. The results showed that this protein, according to the NCBI database (ACCESSION: HQ529468) https://www.ncbi.nlm.nih.gov/nuccore/HQ529468 , consists of 159 amino acids encoded by mRNA (size of 480 bp). Studying of this protein in the UniProt database (Q8H1L1) https://www.uniprot.org/uniprotkb/Q8H1L1/entry revealed that the protein may be Cellular component in both the cytoplasm and nucleus. This protein shows molecular function such as protein phosphatase inhibiting, abscisic acid binding, signaling receptor activity. Also it can play a role in biological processes like abscisic acid-activated signaling pathways and plant defense responses. According to InterPro database https://www.ebi.ac.uk/interpro/protein/UniProt/Q8H1L1/ , the protein belongs to the plant hormonal and defense protein family. It contains the pathogenesis-related BetVI family protein domain. Furthermore, the NCBI database (AEE69030.1) https://www.ncbi.nlm.nih.gov/Structure/cdd/wrpsb.cgi?INPUT_TYPE=live&SEQUENCE=AEE69030.1 identified a conserved domain with a specific hit named Bet_v1-like and a superfamily related to SRPBCC for this protein. These findings suggest that this protein likely plays a significant role in the defense mechanisms of <i>H. perforatum</i> . Further investigation of this protein could contribute to a better understanding of the hypericin biosynthetic pathway in this plant.

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Poster Presentation ID: 1343

Effects of *Nigella sativa* Oil on Experimental Wound Healing and Blood Parameters after Surgery

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ARTICLE INFO

Keywords:

Skin

Nigella sativa

Wound healing

Rejuvenation

Organic oil

ABSTRACT

Nigella sativa oil is an organic plant oil that it has some unique features like; increasing the speed of wound healing, preventing from lasting inflammations and decreasing the infections. These functions are because of two important factors like lupeol and tyymoquinone. In this study sixteen adult male rats were used in two groups as control and treatment. The main age was 3 months, the main weigh was 200-250 gr and wound's physiologic changes were evaluated during days; 0, 14 and 21. Rats were anesthetized with ketamine_xylazine and the surgery applied with 8mm biopsy punch in a standard situation. after that 1cc *Nigella sativa* oil was injected in open wound on the rat skin directly. In this study, the blood parameters have shown antibiotic activities and according to physiologic changes, the wound healing in control group wasn't regular but in treatment group was regular with nearly circular formation. The scar in treatment group was minimum and it was against the control group. Additionally, the treatment group after passing the surgery and wound healing steps was without any infections and it was a good result for the main study. Thus, the studies have proven that *Nigella sativa* oil in experimental wound healing or surgeries, can have a main rule as an organic antibiotic and an organic factor for preventing from scar formation and increasing the skin wound healing ability and power.

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Poster Presentation ID: 1344

Effects of Simultaneous Use of *Nigella sativa* Oil and Microneedling on Experimental Wound Healing and Blood Parameters after Surgery in Adult Male Rats

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ARTICLE INFO	ABSTRACT
Keywords: Skin <i>Nigella Sativa</i> Microneedling Rejuvenation Wound healing	Skin aging is a complex combination of the passage of time, reduction in activity of the skin texture and wound healing ability and increased the rate of collagen and elastic fibers atrophy. So, increasing the level of UV radiation, can increase the level of skin texture atrophy. The world is trying to find a way for combating with skin aging, in this study we want to prove the positive effects of Simultaneous use of the <i>Nigella sativa</i> oil and Microneedling against the aging and scars, in skin rejuvenation and wound healing. A total of cases were, sixteen adult male rats, aged three months and between 200 and 250gr weigh. All were randomly assigned into two groups: control and treatment. After anesthesia with ketamine-xylazine, a standardized 8-mm skin wound was created with using a 8mm biopsy punch and 1cc <i>Nigella sativa</i> oil were applied. Microneedling was done with derma-pen in straight lines on the main wound. The Blood parameters and physiologic changes were studied. wound's physiologic changes were evaluated during days; 0, 14 and 21. According to physiologic changes in control group, the wound healing was irregular and star like formation with scar at end. In treatment group wound healing was regular and without any scars like the control group. In this study, blood parameters and physiologic changes have shown the positive rules of <i>Nigella sativa</i> oil as an antibiotic and anti inflammation organic drug and positive rules of Microneedling against the skin aging, with the best effects in using the both in the same time. So the Simultaneous use of <i>Nigella sativa</i> oil and Microneedling on wound healing was successful and functional and it can be used as an effective way for combating the skin aging and scar formation in wound healing.

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Poster Presentation ID: 1345

Enhancement of Antioxidant Activity and Phenolic Compounds in *Salvia leriifolia* Benth. (Lamiaceae) Irradiated with Gamma Ray

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ARTICLE INFO

Keywords:

Regulation
Callus culture
Gamma ray
Secondary metabolites
Salvia leriifolia

ABSTRACT

Gamma radiation, by inducing stress in plants, activates defense mechanisms that can lead to an increase in secondary metabolites, such as phenolic compounds. Species within the *Salvia* genus are considered rich sources [1]. This study investigates the enhancement of phenolic compounds and antioxidant activity through gamma irradiation in *Salvia leriifolia* callus cultures. Callus induction was achieved from leaf explants cultured on (MS) medium supplemented with varying concentrations of (NAA) (0, 5, 10, 15, and 20 μ M) and (BA) (0, 5, 10, 15, and 20 μ M). The combination of 20 μ M NAA and 15 μ M BA was the best treatment for callus growth and proliferation. Proliferated calli were then exposed to different doses of gamma radiation (0, 10, 20, 40, 60, 80, and 100 Gy) from a Co60 source. After 60 days, callus growth, antioxidant activity and phenolic compounds content were evaluated. Low doses of gamma radiation were enhanced callus growth, the highest fresh and dry weight observed at 20 Gy (8.13 g and 0.69 g, respectively). In contrast, higher doses (80 Gy and 100 Gy) significantly inhibited callus growth. Results indicated total phenol and flavonoid contents, as well as antioxidant activity, increased significantly with gamma radiation doses ranging from 10 to 80 Gy compared to the control. The highest total phenolic, total flavonoid and antioxidant activity levels were observed at 80 Gy, with values of (193.19 mg/g DW, 62.95 mg/g DW and 61.05 mg/mL DW respectively). A positive correlation was observed between increased phenolic and flavonoid content and enhanced antioxidant activity, suggesting that phenolic compounds act as major antioxidants in response to gamma radiation. The ability of gamma radiation to enhance phenolic compounds has been observed in various plant species and callus cultures, such as *Silybum marianum* [2], *Leontopodium alpinum* [3]. This study demonstrates that applying specific doses of gamma radiation in *S. leriifolia* callus cultures can enhanced production of metabolic compounds. These findings suggest a promising strategy for improving secondary metabolite production in plant tissue cultures through gamma irradiation.

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Poster Presentation ID: 1346

Effect of Different LED Light Spectra on Total Phenolic Content in *Tanacetum parthenium*

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ARTICLE INFO	ABSTRACT
Keywords: <i>Tanacetum parthenum</i> LED Light Total Phenolic	Light is a crucial environmental cue that governs plant growth and photosynthesis. It also modulates key physiological and biochemical pathways, influencing the biosynthesis of secondary metabolites. In this context, a completely randomized design experiment with six replications was conducted in the research greenhouse of the Faculty of Agriculture at Shahrekord University to assess the total phenolic content of feverfew (<i>Tanacetum parthenium</i>) flowers. This study evaluates the effects of different LED light spectra: 100% red (R), 100% blue (B), 100% white (W), 50R:50B, 50R:50W, and natural greenhouse light (control, C) on phenolic compound accumulation in <i>T. parthenium</i>. ANOVA revealed significant differences ($p < 0.01$) in total phenolic content across the LED light spectra. The 100% white light spectrum yielded the highest phenolic content (157.92 mg GAE/g DW), while the control treatment showed the lowest (67.78 mg GAE/g DW). These findings demonstrate that LED light quality significantly influences phenolic compound biosynthesis in <i>T. parthenium</i>. The superior efficacy of white light may stem from its broader wavelength range, potentially enhancing photoreceptor activation involved in secondary metabolite production. This study highlights the potential of tailored LED light spectra to enhance phenolic content and, consequently, the medicinal quality of <i>T. parthenium</i> in controlled cultivation systems.

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Poster Presentation ID: 1349

Challenges in implementing the national cropping pattern of medicinal plants

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ARTICLE INFO

Keywords:

Cropping pattern

Economy

Scientific map

ABSTRACT

It is obvious that the management, development and production technology of medicinal plants in the National Cropping Pattern is necessary and inevitable. The national project for the management, development and production technology of medicinal plants in the national cultivation model with the aim of investigating the existing medicinal plant production systems and calculating the expected performance and performance gaps of common and proposed products, checking the compatibility of existing medicinal plants with cultivation potential in the region, determining the calendar agriculture based on different species and climates, investigation of cultivation methods such as mixed cultivation, under-tree cultivation and crop rotations and the feasibility of changing it, technical coefficients of fertilizer need and pesticide consumption, collection of technical coefficients for the use of agricultural machinery, calculation of technical coefficients of production in the current state and determination of standard conditions, calculation of technical coefficients of waste reduction and determination of standard conditions and determination of technical goals and limitations, investigation of the effect of stresses, investigation of medicinal plant production management methods is being implemented in different climates of 31 provinces in the country. The limited production resources in the agricultural sector of medicinal plant production, and especially the water shortage in the arid and semi-arid country of Iran, have made optimizing the use of inputs an undeniable reality. On the other hand, due to the existence of numerous risks, especially risks arising from climatic conditions and economic variables, Lack of processing in medicinal plants, the agricultural product market, lack of mechanized medicinal plant farms and the risk aversion of most farmers, optimum cropping pattern of medicinal plants in this important economic sector is of particular importance. It seems that the country's current cropping pattern for medicinal plants is mostly influenced by past practices and based on available water and soil resources, although economic benefits have also been considered to some extent. Due to rapid climate changes, as well as the high volatility of economic variables in the country, and due to the lack of competitiveness in the production of many agricultural products, the production of some of these products has faced challenges that require changing the cropping pattern of medicinal plants and moving towards a smart cropping pattern for medicinal plants.

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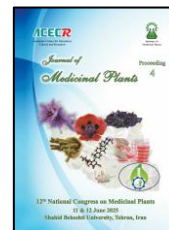
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Poster Presentation ID: 1350

Medicinal macrofungi flora of Iran

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ARTICLE INFO

Keywords:

Macrofungi

Agaricus

Truffle

ABSTRACT

In many parts of the world, Macrofungi and their metabolites are used in the treatment of various human diseases. These macrofungi are of great importance in terms of nutrition, medicine and industry due to their content of essential amino acids, proteins, carbohydrates, fibers, fats, vitamins, ash, polysaccharides and mineral elements. In this study, the flora, importance, nutritional and medicinal value of some species of Iranian medicinal Macrofungi including *Agaricus bisporus*, *Agaricus blazei*, *Amanita caesarea*, *Armillaria mellea*, *Auricularia auricular-judae*, *Auricularia mesenterica*, *Boletus edulis*, *Cantharellus cibarius*, *Coprinus comatus*, *Daldinia concentrica*, *Fomes fomentarius*, *Fistulina hepatica*, *Flammulina velutipes*, *Ganoderma lucidum*, *Ganoderma applanatum*, *Geastrum triplex*, *Grifola frondosa*, *Hericium erinaceus*, *Hymenopellis radicata*, *Inonotus obliquus*, *Lactarius deliciosus*, *Lentinula edodes*, *Macrolepiota procera*, *Morchella esculenta*, *Ophiocordyceps sinensis*, *Panellus stipticus*, *Phallus impudicus*, *Phellinus igniarius*, *Pleurotus ostreatus*, *Pleurotus eryngii*, *Schizophyllum commune*, *Stereum hirsutum*, *Trametes versicolor*, *Trametes betulina*, *Tremella fuciformis*, *Tremella mesenterica*, *Tuber* spp. and *Xylaria polymorpha* were investigated.

References

Mackizadeh Tafti, M., 2025. Management, development and production technology of medicinal plants in "National Cropping Pattern", Agricultural Research, Education and Extension Organization (AREEO)



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Poster Presentation ID: 1352

The effect of gibberellin hormone application on morphological traits and yield of *Hibiscus sabdariffa* L.

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ARTICLE INFO

Keywords:

Hibiscus sabdariffa L.

Growth hormone

Medicinal plant

Cultivation

development

ABSTRACT

Hibiscus sabdariffa L. is a medicinal plant belonging to the Malvaceae family. The leaves, sepals, and seeds of this plant are used medicinally (1). Gibberellin is one of the plant growth regulating hormones that has diverse and different effects on the growth and development of many plants during the growth stages (2). This research was conducted in the two crop years of 2018 to 2019 in the Rig Malek region of Mirjaveh with the aim of developing the cultivation and increasing the yield of this valuable medicinal plant. The experimental treatment used was the growth regulator hormone gibberellin at four concentrations: 0 ppm, 75 ppm, 150 ppm, and 225 ppm. The stages of planting, growing, treatment, and harvesting were carried out according to the principles presented in the sources and recommendations of the professors, and morphological and yield traits were measured. According to the means comparison of the simple effect of gibberellin spraying in the second year, it was observed that the highest plant height with 196.89 cm was in 150 ppm gibberellin and the lowest plant height with 203 cm was in control. The highest grain yield, with 859.29 kg.ha⁻¹, was achieved in the second year by using 150 ppm gibberellin. Mean comparison in the first year showed that the highest number of seeds per boll was obtained with the use of 150 ppm gibberellin with 6.98. The highest dry weight of sepals per boll (0.0326 g), the highest number of bolls per plant (15.01), and the highest number of bolls per square meter (71.49) were also obtained with 150 ppm gibberellin. According to the results obtained, the use of gibberellin helped improve the growth of this plant, and among the treatments used, the using 150 ppm gibberellin was the most suitable.

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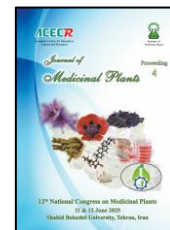
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Poster Presentation ID: 1353

Dual Induction of Hairy Roots and Genetic Transformation by *Rhizobium rhizogenes* Harboring the Squalene Synthase Gene for Enhanced Triterpenic Acid Production in *Dracocephalum kotschy* Boiss.

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ARTICLE INFO

Keywords:

Dracocephalum kotschy Boiss.
Hairy root culture
Lamiaceae
Rhizobium rhizogenes

ABSTRACT

Dracocephalum kotschy Boiss., belonging to the Lamiaceae family, is an endemic medicinal plant in Iran known for its diverse pharmacological properties, including anti-tumor, antibacterial, antifungal, anti-inflammatory, antioxidant, antispasmodic, analgesic, antihyperlipidemic, and immunomodulatory activities. These effects are attributed to its rich array of bioactive compounds, such as flavonoids (e.g., apigenin, luteolin, xanthomicrol), essential oils (e.g., limonene and α -terpineol), and phenolic compounds (e.g., caffeic acid and chlorogenic acid), making the plant valuable for the treatment and prevention of various diseases [1]. Hairy roots (HRs), induced by *Rhizobium rhizogenes* (formerly *Agrobacterium rhizogenes*), are genetically transformed roots that exhibit unique advantages over native plant tissues, including rapid hormone-independent growth, loss of geotropism, and stable production of valuable secondary metabolites. These features make HRs excellent platforms for the biotechnological production of pharmaceutical compounds [2]. In this study, the effects of different bacterial strains on HR induction in leaf explants of *D. kotschy* were investigated. Sterilized seeds of *D. kotschy* were cultured on basic MS medium, and leaf explants from four-week-old seedlings were inoculated with two bacterial strains: a wild-type strain (*R. rhizogenes* A4) and a recombinant *R. tumefaciens* C58C1 (pRiA4) (pBIS-SQS1) carrying the *squalene synthase* (SQS1) cDNA. After 72 hours of co-cultivation on antibiotic-free solid MS medium, the explants were transferred to a medium containing 500 mg/L cefotaxime to eliminate bacterial contamination. The results showed that the A4 strain failed to induce HRs on the explants after 30 days, whereas the recombinant C58C1 strain successfully induced HRs in 27 days, with an induction frequency of 16.67% and an average of 1.03 ± 0.52 roots per explant. These findings suggest that genetic transformation using the SQS1 gene can positively influence HR induction and provide a foundation for enhanced triterpenoid biosynthesis. With further optimization of culture conditions and transformation efficiency, this approach has strong potential for the scalable, cost-effective production of pharmaceutically valuable metabolites in *D. kotschy*.

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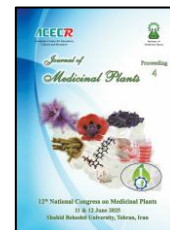
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Poster Presentation ID: 1354

Morphology and Growth Index of Transformed Hairy Roots of *Dracocephalum kotschy* Boiss. Using Recombinant *Rhizobium rhizogenes* Strains

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ARTICLE INFO

Keywords:

Dracocephalum kotschy Boiss.
Hairy root culture
Rhizobium tumefaciens
Specialized metabolites

ABSTRACT

Dracocephalum kotschy Boiss., a herbaceous perennial of the Lamiaceae family, is an endemic species native to Iran. It exhibits a wide range of pharmacological activities, including antihyperlipidemic, immunomodulatory, antinociceptive, and cytotoxic effects, which are attributed to its rich profile of specialized metabolites (SMs), such as methoxylated flavones, essential oils, and rosmarinic acid. The seeds of *D. kotschy* are rich in linolenic acid (61.2%) and protein, while compounds like xanthomicrol and calycopterin show potent anticancer properties through antiproliferative effects on malignant cells, enhanced by methoxylation of the flavone backbone. These characteristics highlight *D. kotschy* as a valuable source of bioactive compounds with promising applications in medicine, particularly cancer therapy [1]. Hairy root (HR) cultures represent a robust biotechnological platform for exploring and enhancing the biosynthesis of plant-derived secondary metabolites [2]. In this study, internode explants from seedlings grown on MS medium were wounded using a sterile needle containing *Rhizobium tumefaciens* C58C1 (pRiA4) (pBIS-SQS1) carrying the *squalene synthase* (SQS1) cDNA. After three days of co-cultivation, explants were transferred to MS medium supplemented with 500 mg/L cefotaxime to eliminate bacterial contamination. Root emergence was observed at infection sites after 27 days. The induced HRs were excised, subcultured on fresh MS medium for one month, and subsequently evaluated for morphological characteristics and growth index (GI). Based on these traits, superior HR lines were selected for further experiments and SM analysis. The results provide a foundational step toward establishing a sustainable, genetically tractable system for the enhanced production of high-value metabolites—such as triterpenic acids and flavonoids—from *D. kotschy*, supporting its potential for pharmaceutical and industrial applications.

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Poster Presentation ID: 1355

Phytochemical Analysis on the Ethyl Acetate Extract of *Centaurea virgata*

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ARTICLE INFO

Keywords:

Centaurea virgate

Flavonoid

NMR

Chromatography

ABSTRACT

Centaurea virgata Lam, a plant of the Asteraceae, is used for treatment of pimples and acne, as well as being a potent diuretic, antitussive and antirheumatic agent [1]. It is also used in folk medicine of Iran as an anti-ulcer for gastrointestinal problems [2]. In our efforts to discover new and potentially bioactive secondary metabolites from Iranian plants, a phytochemical analysis was performed on the ethyl acetate extract of the leaves of *C. virgata*. Column chromatography and thin-layer chromatography (TLC) techniques were employed for purification of the chemical constituents of the extract, resulting in isolation and purification of several flavonoids such as retusin (quercetin 7, 3, 3'', 4'' tetra methyl ether). Their structures were elucidated using modern NMR spectroscopic technique.

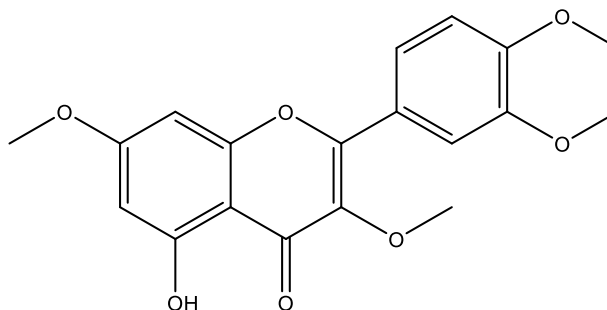


Figure 1. Structure of retusin, isolated from *Centaurea virgata*

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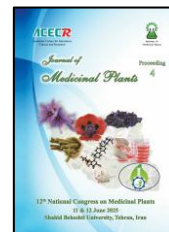
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Poster Presentation ID: 1356

Extraction of Pistachio Oil by Three Methods (Supercritical Fluid, Cold Press, High Shear), Analysis of Fatty Acids, vitamins E, B₁ and Proteins.

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ARTICLE INFO	ABSTRACT
Keywords: Pistachio Fatty Acids Vitamin E, B ₁ Proteins	Pistachio (<i>Pistacia vera</i> L.) from the <i>Anacardiaceae</i> family, is a valuable fruit that contains plant proteins, essential vitamins, and numerous minerals. Pistachios are a rich source of fatty acids such as oleic acid, linoleic acid, linolenic acid, palmitic acid, palmitoleic acid, and stearic acid, which are essential for the human diet [1]. In this project, pistachio oil extraction was carried out using three methods: cold pressure, supercritical fluid, and high-shear mixer, and the oil yield from these three methods was compared. The oils obtained from these three methods were derivatized for fatty acid analysis using a GC-FID device, and the amount of fatty acids present in different samples was studied. Also, two vitamins E and B ₁ were extracted from the oils and analyzed using LC-MS, HPLC, MALDI-TOF MS instruments [2]. The amount of proteins in pistachios was studied using two methods, Kjeldahl and Bradford, and about 12.5% . SDS-PAGE gel was used to observe their protein profile, and the protein bands in the SDS-PAGE gel were enzymatically digested and studied using a MALDI-TOF instruments.

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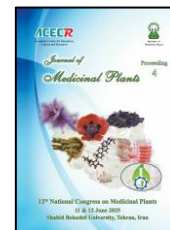
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Poster Presentation ID: 1357

Effects of *Zingiber officinale* on the Cryopreservation of Sperm: Improvements in Freezing and Cooling Results

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ARTICLE INFO	ABSTRACT
Keywords: Sperm <i>Zingiber officinale</i> CASA Cryopreservation Ginger	In order to reproduce chickens and preserve biodiversity, rooster sperm cryopreservation is a crucial technique (Svoradová, Kuželová et al. 2021). Sperm viability and function may be impacted by oxidative stress and membrane damage brought on by the chilling and freezing procedures (Zhang, Wang et al. 2021). <i>Zingiber officinale</i>, commonly known as ginger, is a well-known medicinal plant traditionally used for its anti-inflammatory, antioxidant, and antimicrobial properties. Ginger contains several bioactive compounds, including gingerols, shogaols, and paradols, which contribute to its potent antioxidant activity (Gupta, Sharma et al. 2024). The purpose of this study was to assess how <i>Zingiber officinale</i> affected the freezing and cooling phases of rooster sperm cryopreservation, with particular attention on antioxidant enzyme activities (GPX, TAC, and SOD) and CASA (computer-assisted sperm analysis) characteristics. Mature roosters' semen samples were taken, and they were then preserved in a cryopreservation solution with different <i>Zingiber officinale</i> concentrations (0.5 and 1.0 mg/mL). The samples underwent freezing and cooling procedures. Sperm motility, velocity, and other CASA parameters were included in post-thaw analysis. GPX, TAC, and SOD levels were measured using conventional biochemical methods to evaluate antioxidant activity. To find significant differences between the therapy groups, statistical comparisons were performed. Post-thaw sperm motility, progressive motility, and velocity were all markedly enhanced by <i>Zingiber officinale</i> supplementation ($P < 0.05$). Superior outcomes were shown by the greater concentration (1.0 mg/mL), especially in improving membrane integrity. The efficiency of <i>Zingiber officinale</i> in reducing oxidative stress during cryopreservation was demonstrated by the significantly higher levels of antioxidant enzyme activity (GPX, TAC, and SOD) in the groups treated with it. By improving functional sperm parameters and strengthening antioxidant defenses, <i>Zingiber officinale</i> enhances the cooling and freezing results of rooster sperm cryopreservation. A viable method for maximizing sperm preservation in chicken reproduction is its incorporation into cryopreservation procedures.

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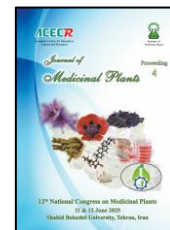
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Poster Presentation ID: 1358

Effect of different organic solvents on extraction of phytochemical content, antioxidant activity and antibacterial activity of aerial parts of *Allium jesdianum* (Bonsorkh)

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ARTICLE INFO

Keywords:

Antimicrobial
DPPH
FRAP
Total phenolic content
Solvent systems

ABSTRACT

Allium jesdianum is recognized as a crucial medicinal and edible species within the *Allium* genus, and it is indigenous to Iran. In the present study, a laboratory investigation was conducted to assess the effects of fractionation by various organic solvents on the total phenolic and flavonoid contents, as well as on the antioxidant and antibacterial activities of the aerial parts of this plant. Aerial parts were collected from their natural habitat in Ravansar County during the spring of 2023. A methanolic extract was prepared via maceration for 48 hours in the dark at room temperature. Subsequently, the dried methanolic extract was fractionated using n-hexane and ethyl acetate. Quantification of total phenolic and flavonoid contents was conducted using the Folin–Ciocalteu and aluminum chloride methods, respectively [1,2]. To assess antioxidant activity, two assays were employed: the 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay and the ferric reducing antioxidant power (FRAP) assay. Furthermore, the antibacterial properties of the extracts were evaluated by determining the minimum inhibitory concentration (MIC) against standard strains of *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. Overall, the results indicated that the ethyl acetate fraction possessed the highest total phenolic and flavonoid contents, measuring 44.25 mg gallic acid equivalents (GAE)/g and 234.75 mg rutin equivalents/g of extract dry weight, respectively. In terms of antioxidant activity, the ethyl acetate fraction exhibited the most potent DPPH radical scavenging capacity with an IC₅₀ value of 0.034 mg/mL, along with the highest FRAP value of 41.83 mM/mg of extract dry weight. In antibacterial assays, the ethyl acetate extract demonstrated the lowest MIC values against all tested bacterial strains, highlighting its superior antimicrobial efficacy. The findings of this study suggest that the ethyl acetate extract of *A. jesdianum* represents a promising natural source of bioactives.

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Poster Presentation ID: 1359

Unveiling the Hepatoprotective Potential of *Astragalus sareinii* Maassoumi: Antioxidant Defense Against CCl₄ Induced Liver Injury in Rats

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ARTICLE INFO	ABSTRACT
Keywords: <i>Astragalus sareinii</i> Oxidative stress Antioxidant enzymes Hepatoprotective effect Liver Injury	In the practice of traditional Chinese medicine, <i>Astragalus</i> species have long been used for a broad variety of medical purposes [1]. The individual components of the dried roots protect the body from diseases induced by oxidative stress. Compounds such as astragalosides, flavonoids, and polysaccharides have been shown to have tissue protective effects that are due to antioxidant mechanisms [2]. <i>Astragalus sareinii</i> Maassoumi is found in the Lorestan province in Iran. In this investigation, the hepatoprotective effects of chloroform extract of <i>A. sareinii</i> on the liver injury inflicted by the carbon tetrachloride was evaluated. Sixty male rats were purchased from the animal shelter of Lorestan University of Medical Sciences. The animals were randomly divided into 6 groups. The rats received 1 ml/kg of carbon tetrachloride (for 28 days twice a week) intraperitoneally alone or with different doses of the extract, and after the treatment period, biomarkers of liver damage (alanine transaminase, aspartate aminotransferase and alkaline phosphatase and bilirubin), oxidative stress markers (lipid peroxidation, superoxide dismutases and glutathione peroxidase) were investigated in liver. Finally, the data were statistically analyzed by one-way analysis of variance (ANOVA) followed by Tukey's multiple comparison test. The administration of carbon tetrachloride caused a significant increase in the serum level of liver damage biomarkers, lipid peroxidation and glutathione peroxidase and decreased activity of superoxide dismutase and catalase in liver ($P < 0.001$). The healing effects were shown in the form of a decrease in liver damage markers in the serum, and a decrease in oxidative stress markers ($P < 0.001$). The study demonstrates that <i>A. sareinii</i> extract exerts hepatoprotective effects against CCl₄ induced liver damage, primarily through reducing oxidative stress and enhancing the activity of antioxidant enzymes. Further research is warranted to identify the active compounds in chloroform extract of <i>A. sareinii</i> and elucidate the mechanisms underlying its pharmacological actions.

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Poster Presentation ID: 1360

Targeting YES1 in Liver Cancer: A Computational Screening of Plant-Based Compounds

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ARTICLE INFO	ABSTRACT
Keywords: Liver cancer YES1 protein Molecular docking plant compounds Phytochemicals	Liver cancer remains one of the most prevalent and lethal malignancies, characterized by high mortality rates and limited therapeutic options. The YES1 protein, a member of the Src family of tyrosine kinases, plays a pivotal role in liver cancer progression, with its overexpression associated with tumor growth, survival, and metastasis. In particular, YES1 is implicated in critical oncogenic signaling pathways, including YAP/TAZ and PI3K/AKT (Garmendia et al., 2022). This study aimed to identify potential plant-derived inhibitors of YES1 as novel therapeutic candidates for liver cancer (Zhou et al., 2016). A total of 110 phytochemicals with reported anticancer activity were selected from the literature. Their 3D structures were retrieved from PubChem and optimized using Avogadro software. The YES1 protein structure was obtained from the Protein Data Bank (PDB), and missing residues were reconstructed using the AlphaFold server, followed by structural refinement. Blind docking of all compounds was conducted using CB-Dock, alongside eight clinically used liver cancer drugs for benchmarking and validation. Comparative analysis of docking scores revealed that Berberine, Guggulsterone, Quercitrin, Ursolic acid, and Taraxasterol exhibited binding affinities comparable to or exceeding those of dasatinib and saracatinib, the top-performing reference drugs. These findings highlight the potential of specific natural compounds as promising candidates for targeted inhibition of YES1 in liver cancer therapy.

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Poster Presentation ID: 1361

Biomachine: A Web-Based Information System for Agricultural Mechanization Technologies with a Focus on Medicinal Plants

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ARTICLE INFO

Keywords:
Web-Platform
Agri-Mechanization
Biomachine
Digital Agriculture
Medicinal-Plants

ABSTRACT

The precise and optimized application of mechanization technologies in agriculture and natural resources is critical for enhancing global crop productivity and sustainable resource management. As digital transformation becomes indispensable across sectors, information technology offers significant potential to evaluate and compare technological solutions. This study introduces *BioMachine* (<https://biomachine.ir/>), the first dedicated web-based database in Iran for aggregating and systematizing information on agricultural and natural resource mechanization technologies. Developed using PHP and MySQL, the platform categorizes technologies into nine hierarchical groups, enabling stakeholders to access standardized technical specifications sourced directly from manufacturers. A key innovation of *BioMachine* is its advanced search functionality, which allows users to filter technologies by multiple criteria, including name, category (e.g., medicinal plant processing), sub-branch, country of origin, application context, producer details, and regional production data. Such granularity supports targeted decision-making for farmers, manufacturers, policymakers, and researchers seeking to identify gaps, adopt best practices, or localize technologies. By centralizing dispersed data into a structured, queryable repository, the database addresses critical challenges in technology dissemination, such as information asymmetry and accessibility barriers. The platform's design emphasizes practicality, with manufacturer-verified entries ensuring reliability, while its scalable architecture permits continuous expansion. *BioMachine* not only facilitates comparative analysis of mechanization solutions but also serves as a benchmark for future digital tools in agri-tech governance. Its implementation underscores the role of ICT in bridging knowledge divides and fostering evidence-based agricultural development, particularly in specialized sectors like medicinal plant cultivation. Future work will integrate user feedback to enhance interoperability and regional adaptability.

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Poster Presentation ID: 1362

Estrological study of ovarian tissue, in female rats treated with aqueous-alcoholic extract of *Fenugreek* leaf (*Trigonella foenum-graecum* L.)

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ARTICLE INFO

Keywords:

Sex hormones

Ovarian follicle

Fenugreek leaf extract

ABSTRACT

Considering the different effects of fenugreek plant on sex hormones, in this research, ovarian tissue treated with aqueous-alcoholic extract of fenugreek leaf was studied. In this research, 32 Wistar rats were selected, and after preparation of aqueous-alcoholic extract of fenugreek leaf and determination of doses to treat rats, they were randomly grouped. The groups included control (healthy mice), treatments 1, 2 and 3, which respectively received 125, 250 and 500 mg/kg bw of the prepared extract daily by gavage for 28 days. Then the rats were anesthetized, and blood was taken from their heart to check the hormonal parameters. Their ovaries were immediately separated, half of them were placed in fixative solution for histological study, and the other half was placed in RNAlater solution for molecular study. The obtained data were analyzed. The consumption of fenugreek in low doses did not cause significant changes in the tissue and function of the ovary, but with the consumption of the maximum dose of the extract (500 mg/kg bw), there was a decrease in sex hormones and the number of all types of follicles except atretic follicles, reduction in weight and volume of ovary, reduction in the volume of the cortex, and the thickness of the granulosa layer. These changes indicate the effects of fenugreek extract abuse on ovarian structure and function. It is concluded that the aqueous-alcoholic extract of fenugreek leaf in a small amount does not have a significant effect on the ovary, but with the consumption of a larger amount, it causes adverse effects on both the tissue structure and the function of the ovary. Therefore, it is recommended to avoid consuming a large amount of it for women, especially during pregnancy.

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Poster Presentation ID: 1363

Evaluation of the Adjuvant Effects of Hydroalcoholic Mistletoe Leaf Tincture (*Viscum album*) on Tumor Markers in Breast Cancer Patients

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ARTICLE INFO

Keywords:

Breast cancer
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Adjuvant therapy
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ABSTRACT

Breast cancer is one of the most common malignancies in women, and tumor markers like CEA, CA 15-3, and CA 125 are widely used to evaluate treatment effectiveness and monitor disease progression. This study aimed to assess the impact of adjuvant therapy with hydroalcoholic tincture of mistletoe leaves (*Viscum album*) on the levels of these tumor markers in breast cancer patients. A total of 30 patients who visited Dr. Qadir Mohammadi's health center between 2023 and 2024 were included in the study. Among these patients, 80% had invasive ductal carcinoma, and 20% had lobular carcinoma, all with a BIRADS score higher than 3. Nearly 95% of the patients had previously undergone one of several surgical procedures, including total mastectomy, partial mastectomy, or lumpectomy. Concerned about the side effects of chemotherapy and radiotherapy, these patients chose to discontinue these treatments and instead opted for adjuvant therapy with hydroalcoholic mistletoe leaf tincture. The treatment lasted between 3 and 4 months, and tumor marker levels were measured before and after the treatment. Data analysis was performed using paired t-tests and SAS version 9.3 statistical software. The results showed a significant decrease in the levels of CEA, CA 15-3, and CA 125 after treatment. Specifically, CEA levels decreased from 6.04 ± 0.45 to 3.67 ± 0.38 , CA 15-3 dropped from 39.72 ± 3.12 to 30.28 ± 2.45 , and CA 125 decreased from 34.84 ± 2.98 to 29.25 ± 2.15 , all with statistically significant differences ($P < 0.01$). These findings suggest that hydroalcoholic mistletoe leaf tincture may effectively reduce tumor markers, potentially indicating a decrease in tumor burden and clinical improvement in patients. Furthermore, previous research has supported the anticancer properties of mistletoe, showing that its standardized extracts can inhibit cancer cell growth and improve patients' quality of life [1, 2]. Based on these promising results, mistletoe could be considered as a complementary treatment alongside conventional breast cancer therapies. However, further studies with larger sample sizes and more rigorous designs are needed to confirm these findings.

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Study of different extraction methods for *Berberis spp.* alkaloids

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ARTICLE INFO	ABSTRACT
Keywords: Barberry Alkaloid Extraction Ultrasonic HPLC	The barberry family (Berberidaceae) includes 15 genera and 650 species, mostly distributed in the temperate regions of the Northern Hemisphere. This genus in Iran has five shrub species named <i>Berberis vulgaris</i> L., <i>Berberis integerrima</i>, <i>Berberis khorasanica</i>, <i>Berberis crataegina</i>, and <i>Berberis orthobotrys</i>. The seedless garden barberry cultivated in Khorasan appears to be a cultivar of <i>Berberis integerrima</i> that has been seedless and could perhaps be called <i>Berberis integerrima</i> "Asperma" (Behrad, et al., 2023). The aim of this study is to investigate different methods of extract extraction to determine the best extraction method for measuring berberine and palmatin alkaloids in barberry stems. For this purpose, the stem of the barberry plant collected from its natural habitat, dried at room temperature, was ground well, and extraction was performed in six different ways using two solvents: water and methanol. 1-Extraction of the extract using a mixture of chloroform, methanol, ammonia solvents in the proportions (15:5:1) with a method suitable for extracting alkaloids (Kamada <i>et al.</i>, 1986), 2-Extraction using 80% methanol solvent with pH=3 by ultrasonic method (Yahyazadeh <i>et al.</i>, 2024), 3- Extraction using methanol solvent by maceration method, 4-Extraction using methanol solvent by Soxhlet method, 5- Extraction using water solvent and heating in a water bath, 6- Extraction using water solvent by ultrasonic method for half an hour. Then, the amount of berberine and palmatin alkaloids in barberry extract was examined using HPLC. The results showed that the highest amount of berberine and palmatin alkaloids was obtained in extraction method 2 and the lowest amount was obtained in extraction method 1. Therefore, extraction using 80% methanol solvent with pH=3 by ultrasonic method is more suitable than other methods.

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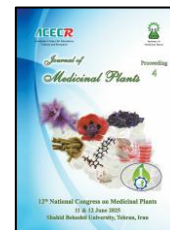
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Poster Presentation ID: 1368

Investigating the Impact of *Althea Kurdica* Extract on Cellular Processes: A Study on Genotoxicity, Mutagenicity, and Cytotoxicity

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ARTICLE INFO	ABSTRACT
Keywords: Althea Extract Genotoxicity Mutagenicity Cytotoxicity Cytotoxicity	Natural compounds derived from plants are widely acknowledged as effective agents in chemotherapy, primarily due to their ability to modulate key cellular and molecular processes involved in cancer progression and suppression. Such efforts are critical, as they may lead to the development of innovative complementary therapies and preventive strategies for cancer management. The important bioassays employed for the preliminary screening of plant extracts are the Allium test, the MTT and Trypan blue exclusion assays at the animal cell level, have gained significant attention in recent years. In the present study, the genotoxic, mutagenic, and cytotoxic activities of various plant extracts were systematically evaluated to determine their capacity to inhibit cell proliferation in different cell lines. Among the plants investigated, <i>A. kurdica</i>, a widely recognized medicinal plant traditionally known for its antimicrobial, anti-inflammatory, and analgesic properties, demonstrated remarkable potential. The methanolic extract of <i>A. kurdica</i> was utilized in the assays, given its effectiveness in extracting a wide range of bioactive secondary metabolites. The results obtained from the Allium test indicated that treatment with <i>A. kurdica</i> methanolic extract at a concentration of 10 µg/mL significantly reduced the mitotic index and inhibited normal cell division. Cytological observations revealed the presence of several mitotic abnormalities, including anaphase bridges, micronuclei formation, multipolar anaphases, and chromosome clumping, all suggesting genotoxic stress. Furthermore, cytotoxicity assessments on normal human lymphocytes and the K562 cancer cell line revealed a marked decrease in cell survival rates, with approximately 40–70% inhibition of K562 cell proliferation observed in a dose-dependent manner. Therefore, further investigations, including molecular and biochemical analyses, are warranted to elucidate the specific pathways targeted by <i>A. kurdica</i> constituents. This could ultimately contribute to the development of novel, plant-based anticancer therapies with improved safety and efficacy profiles.

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Poster Presentation ID: 1369

Harnessing Nature's Nanocarriers: milk exosomes for drug delivery

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ARTICLE INFO	ABSTRACT
Keywords: Exosome Drug Delivery System Nanocarrier	Milk exosomes are promising natural nanocarriers for drug delivery due to their biocompatibility, low immunogenicity, and protection of drugs from enzymatic breakdown. Their phospholipid bilayer improves cargo stability, bioavailability, and targeted delivery via surface markers, enhancing treatment efficacy and reducing side effects. Abundant, biodegradable, and non-toxic, they offer a safe, scalable platform for systemic therapies. In this study, milk was used as a cost-effective exosome source. Sequential centrifugation removed fat, somatic cells, and caseins, followed by size exclusion chromatography purification. Exosomes were resuspended in PBS and stored at -80°C, yielding abundant nanocarriers sized 50–250 nm with high encapsulation efficiency and stability. Isolated milk exosomes showed stable, non-toxic drug loading and sustained release capabilities. Their natural origin, scalability, and unique structure mark an advance in drug delivery, supporting multiple therapeutics. Increasingly studied in pharma and medicine, milk exosomes offer a versatile platform combining biocompatibility with targeted, effective therapy. Overall, milk exosomes hold potential to revolutionize drug delivery with scalable production and strong safety, enabling improved disease treatments through enhanced efficacy and fewer side effects.

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Ultrasound-assisted green synthesis of Fe₃O₄/CuO nanoparticles and investigation of the antibacterial activities using a microfluidic device

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ARTICLE INFO

Keywords:

Fe₃O₄/CuO NPs

Ficus Carica

Antibacterial activity

Microfluidic system

Ultrasonic-assisted
extraction

ABSTRACT

Green chemistry has gained significant attention for its innovative applications, particularly in the synthesis of nanostructures. This study presents an eco-friendly method for synthesizing Fe₃O₄/CuO NPs using an ultrasound-assisted process with an aqueous extract derived from the leaves of *Ficus Carica*. The extract was prepared through ultrasonic-assisted extraction for 20 min at 45 °C. The synthesized Fe₃O₄/CuO NPs were characterized using various techniques. UV-visible spectroscopy and ultraviolet-visible absorption measurements were utilized to analyze optical properties. Other methods, including X-ray diffraction, Zeta Sizer analysis, and dynamic light scattering, were employed to evaluate particle size and structural properties. A broad absorption peak near 525 nm confirmed the successful formation of Fe₃O₄/CuO NPs, while Transmission Electron Microscopy revealed that the average particle size of the nanoparticles was lower than 41.5 nm. Zeta potential measurements indicated moderate colloidal stability, with a value of +24.2 mV, and XRD analysis confirmed their cubic crystalline structure, aligning with established standards. The Fe₃O₄/CuO NPs exhibited significant antibacterial activity against *E. coli*, with a MIC of 1.56 mg/mL and MBC of 3.25 mg/mL, outperforming the *Ficus Carica* extract. Nucleic acid leakage results indicated increased nucleic acid leakage at 260 nm from 0.272 to 0.957 for Fe₃O₄/CuO NPs and from 0.272 to 0.559 for the extract in the traditional method, while in the microfluidic system, leakage increased from 0.250 to 1.06 for Fe₃O₄/CuO NPs and from 0.256 to 0.587 for the extract. Microfluidic system tests further confirmed the enhanced antibacterial effects of Fe₃O₄/CuO NPs, evidenced by higher nucleic acid and protein leakage from bacterial cells and morphological alterations observed via SEM, including cell shrinkage and disintegration. The microfluidic system also demonstrated faster results compared to the conventional methods.

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Poster Presentation ID: 1374

Enhancing Active Compound Biosynthesis in Licorice (*Glycyrrhiza glabra* L.) Hairy Roots via Spectral Light Elicitation

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ARTICLE INFO

Keywords:

Active substances
Abiotic elicitors
Hairy root culture
Licorice

ABSTRACT

The licorice plant (*Glycyrrhiza glabra* L., Fabaceae) an industrially significant medicinal species is well known due to its widely utilization in diverse industries [1]. This study aimed to investigate the effects of various light spectra elicitor on hairy root growth and active substances production in a fast-growing transgenic line (S) of licorice. Cultures were exposed to different light spectra including blue, red, combined blue-red light, and darkness (control) over five weeks based on completely randomized design with three replicates. The hairy roots growth, phenolic content, antioxidant activity as well as the levels of glycyrrhizic acid, isoliquiritigenin, and glabridin were assessed. The results revealed that exposure to blue light, and combination of blue - red light exhibited the higher growth rate of hairy roots than red light or darkness (control). Application of all light treatments led to increasing of antioxidant activity over time. Total phenol content increased by exposure of samples to blue light as well as darkness over time. The better performance of light spectra in case of improving active substances production demonstrated the effective role of combined blue - red light in production of glabridin and isoliquiritigenin and also blue light in glycyrrhizic acid and isoliquiritigenin production. Metabolite analysis confirmed that light spectra can be strategically utilized to enhance secondary metabolite production in licorice. This study serves as a primary result for further research regarding optimizing the production of valuable pharmaceutical metabolites of licorice.

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Metabolomic Insights into Iranian *Rosa damascena* Essential Oils: A GC-FID and GC-MS Approach

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Keywords:

Rosa damascena

Essential oil

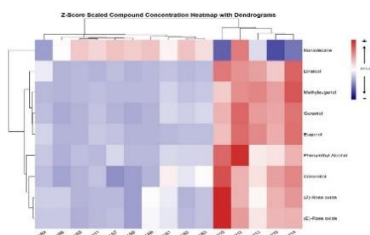
Citronellol

GC-MS

Heatmap

ABSTRACT

Rosa damascena Mill., commonly known as Damask rose and a member of the Rosaceae family, produces one of the world's most valuable essential oils, characterized by over a hundred volatile constituents. This oil exhibits a wide range of biological activities, such as antimicrobial, calming, and sedative effects, making it highly sought after in medicine, aromatherapy, cosmetics, hygiene, and food industries. Notably, elevated levels of compounds like citronellol, geraniol, and phenethyl alcohol are preferred in rose oil, whereas lower concentrations of nonadecane and methyl eugenol are desirable for quality and safety. In this investigation, 15 rose oil samples collected from various regions of Iran underwent analysis via GC-FID and GC-MS. The study focused on nine key components—citronellol, geraniol, nonadecane, phenethyl alcohol, rose oxide (*cis* and *trans*), linalool, eugenol, and methyl eugenol—due to their significant roles in the oil's properties and quality. Standardized and normalized Z-distribution data enabled two-way clustering using the pheatmap and ggplot2 packages in R, resulting in a heatmap visualization. The analysis distinguished two main sample clusters: one with above-average concentrations of the studied compounds, and another with below-average levels. Additionally, three discrete metabolite clusters were identified. These results highlight the substantial chemical diversity present in Iranian *Rosa damascena* essential oils, which likely arises from genetic variation, environmental influences, and differences in extraction techniques [1-3].



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Effects of altitude gradient on some functional of *Ferula haussknechtii* H. Wolhff ex Rech. f. at Rangelands, Saral of Kurdistan

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ARTICLE INFO

Keywords:

Mountain rangelands
Altitude
Ferula haussknechtii H.
Wolhff ex Rech. f.
Saral

ABSTRACT

One of the most important for rangeland management and sustainable use of medical species understanding environmental factors affecting vegetation is. This research was conducted to evaluate of the environmental factors affecting functional characteristics (density, regeneration and height) of *Ferula haussknechtii* H. Wolhff ex Rech. f. in Saral rangelands of Kurdistan. After determining three elevation classes (1850, 2250 and 2650 m), systematic-random sampling was performed for measuring aboveground height, density of *Ferula haussknechtii* H. Wolhff ex Rech. f. with 1.5 m² plot along the transect. The results showed that aboveground biomass, height and density of *Ferula haussknechtii* H. Wolhff ex Rech. f. increased with increasing elevation. Also, the results showed that the Associated plant species and Dominant species are change elevation. Since each plant species has a specific ecological niche in relation to the soil characteristics and physiographic factors, studying and also recognizing the ecological niches of this species can help to better introducing this species in capable areas, as well as better establishment in the improvement and restoration of vegetation cover.

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Poster Presentation ID: 1380

Valorization of Saffron Petals: Liposomal Encapsulation and Antioxidant Evaluation of a Bioactive-Rich Extract

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ARTICLE INFO	ABSTRACT
Keywords: Saffron petal extract Liposomal nanoparticles Chitosan coating Antioxidant activity Ethanol injection method FRAP assay Phenolic compounds	Saffron (<i>Crocus sativus</i> L.) is one of the most valuable medicinal plants, used for centuries worldwide due to its therapeutic and nutritional properties. Saffron petals, a byproduct of saffron production, are generated in large quantities and often discarded as agricultural waste. However, these petals contain bioactive compounds with high added value, such as phenolic compounds, which can play a significant role in promoting human health [1]. On the other hand, novel drug delivery systems such as liposomes offer effective solutions for enhancing the efficiency of plant-based compounds and addressing issues like low bioavailability [2]. This study aimed to prepare and evaluate liposomal nanoparticles containing saffron petal extract. A hydroalcoholic extract of saffron petals was prepared using the maceration method. The extraction yield, total anthocyanin content (TAC), total phenolic content (TPC), and total flavonoid content (TFC) were measured as $66.74 \pm 0.34\%$, 9.60 ± 0.05 mg/L, 83.87 ± 2.29 mg GAE/g extract, and 8.96 ± 2.28 mg QE/g extract, respectively. Liposomal nanoparticles containing the extract were prepared using the ethanol injection method. For this purpose, 28 experimental formulations were designed and conducted. Parameters such as particle size, polydispersity index (PDI), and encapsulation efficiency were evaluated. In the optimized formulation, the particle size, PDI, and encapsulation efficiency were determined to be 256.9 ± 4.3 nm, 0.15 ± 0.03, and $89.6 \pm 0.2\%$, respectively. To improve the stability and storage of the nanoparticles, chitosan was applied as a polymeric coating layer. The drying process was carried out using both spray drying and freeze-drying techniques. The morphology of the resulting powders was analyzed by scanning electron microscopy (SEM), and interactions between the extract, phospholipids, and polymer were investigated using ATR-FTIR spectroscopy. Finally, the antioxidant properties of the liposomal nanoparticles were assessed using the FRAP assay. The results demonstrated that the prepared formulation effectively preserved and enhanced the antioxidant properties of the saffron petal extract.

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Poster Presentation ID: 1381

Application of gold nanorod (GNR) as an ultra sensitive colorimetric probe for early-stage diagnosis of chronic myeloid leukemia (CML)

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ARTICLE INFO

Keywords:

Gold nanorods
Optical-biosensors
RSM
Leukemia

ABSTRACT

Gold nanorods (GNRs) have emerged as promising optical biosensors due to their tunable plasmonic properties. However, their synthesis requires precise control over multiple parameters to achieve optimal morphology and performance. In this study, a systematic approach was presented for the synthesis and optimization of GNRs using a fractional factorial design (FFD) for initial parameter screening, followed by a Box-Behnken design (BBD) to refine more effective parameters. The optimized GNRs exhibit enhanced uniformity and aspect ratios, as confirmed by UV-Vis-NIR spectroscopy and TEM¹. For biosensing, thiol-functionalized aptamers were immobilized on GNR surfaces, enabling selective targeting of K562 cells, a model for chronic myeloid leukemia (CML). The aptamer-conjugated GNRs exhibited high sensitivity in discriminating CML progression stages via LSPR shifts, with minimal non-specific binding^{2,3}.

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Poster Presentation ID: 1383

Influence of the Phenological Stage on the Bioactive Compounds Content and Antioxidant Capacity of *Ammi visnaga* L.

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ARTICLE INFO	ABSTRACT
Keywords: <i>Ammi visnaga</i> L. Phenological stages Extract Phytochemicals Antioxidant activity	<i>Ammi visnaga</i> is a perennial plant in the Apiaceae family. It is a plant native to the Mediterranean region, known for its vasodilatory action and potential to treat conditions such as hypertension and angina, which is very useful for renal stone deposits. This study was conducted to evaluate differences between phytochemicals content and antioxidant properties of hydroalcoholic extract from aerial parts of <i>Ammi visnaga</i> at various phenological stages of plant growth, specifically, the vegetative, full blooming and seed setting stages. The total phenolic and flavonoid contents of the samples were determined by spectrophotometric methods and antioxidant activity was evaluated by DPPH. The highest value of total phenolic (71.27 ± 0.65 mg GAE/g dry extract) and flavonoid (51.85 ± 0.47 mg QE/g dry extract) contents were recorded in %70 ethanolic extract from the full-flowering stage compared to other two stages. The radical scavenging assay showed that <i>Ammi visnaga</i> has maximum activity at the flowering stage ($IC_{50} = 268.89 \pm 2.06$ μg/mL), about 51% of the potency of synthetic standard butylated hydroxyanisole (BHA) as positive control ($IC_{50} = 138.03 \pm 1.75$ μg/mL). Additionally, the lowest antioxidant activity was determined in the hydroethanolic extract from <i>Ammi visnaga</i> aerial parts, collected at seed maturity ($IC_{50} = 544.90 \pm 1.83$ μg/mL). There was a significant linear correlation between antioxidant activity with phenolic and flavonoid compounds ($R^2 = 0.9594$ and 0.9711, respectively). The study emphasizes the critical role of phenological stages in the accumulation of phenolic compounds and their biological activity in <i>Ammi visnaga</i>. The findings suggest that hydroalcoholic extract from <i>Ammi visnaga</i> aerial parts, especially those collected at the full-flowering period, are promising candidates for further research into bioactive compounds with potential medicinal applications. The strong antioxidant activity of this extract highlights its potential for development into natural pharmaceutical products.

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Determination of Total Phenol and Antioxidant Activity of Various Extracts of *Pistacia atlantica* and Identification of Its Essential Oil Composition

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ARTICLE INFO

Keywords:

Pistacia atlantica

Antioxidant activity

Phenolic content

GC-MS

ABSTRACT

Pistacia atlantica is a medicinal plant widely recognized for its phenolic and antioxidant constituents. This study aimed to evaluate the total phenolic content and antioxidant activity of various extracts and fractions of *P. atlantica* fruit, and to identify the major components of its essential oil and hexane extract. Fruits were collected from Ardakan, Fars (Iran) in November 2024. Methanolic and hexane extracts were prepared via maceration and Soxhlet extraction, respectively. The methanolic extract was further partitioned into butanol, ethyl acetate, hexane, and water fractions. Total phenolic content was determined using the Folin-Ciocalteu method, and antioxidant activity was assessed by the DPPH radical scavenging assay. The butanol fraction exhibited the highest total phenolic content (expressed as gallic acid equivalent), followed by the ethyl acetate fraction. Regarding antioxidant capacity, the ethyl acetate fraction showed the strongest activity with an average IC₅₀ of 26.58 µg/mL, followed by the butanol fraction with an IC₅₀ of 29.47 µg/mL. Both fractions demonstrated high DPPH inhibition percentages (above 83%) at higher concentrations. The hexane and water fractions showed comparatively lower antioxidant activities. GC-MS analysis of the essential oil identified α-pinene, β-pinene, and limonene as the predominant volatiles, while the hexane extract contained fatty acids such as oleic acid, linoleic acid, and palmitic acid. These findings highlight the strong antioxidant capacity of the ethyl acetate and butanol fractions, and the presence of key bioactive compounds. This supports the potential application of *P. atlantica* as a natural antioxidant source in pharmaceutical and nutraceutical industries.

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Poster Presentation ID: 1385

Chemical Composition and Antiradical Activity of Essential Oil from Seeds of *Visnaga daucooides* Gaertn.

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ARTICLE INFO	ABSTRACT
Keywords: <i>Ammi visnaga</i> L. Chemical composition Essential oil GC/MS Radicals scavenging	<i>Visnaga daucooides</i> Gaertn., Family Apiaceae, also known as Khella Baldi or toothpick weed, is an annual or biennial herb indigenous to the Mediterranean region of North Africa, Asia, and Europe. The plant is known to have been used in traditional medicine a long time ago. It is proven biological effects in the monographs of European Pharmacopeia and World Health Organization. These pharmacological activities are due its valuable chemical constituents that include mainly essential oil and polyphenolic compounds. In this work, the chemical composition of the essential oil obtained by hydrodistillation of <i>Ammi visnaga</i> seeds was analyzed by gas chromatography-mass spectrometry (GC-MS), and thirty components were identified (91.57%). Butanoic acid, 2-methyl-, 2-methylbutyl ester, isopentyl isovalerate, thymol, β-bourbonene, germacrene D, caryophyllene oxide, isobutyric acid, tridecyl ester, verticicol and geranylgeranyl acetate were found to be the major components. The free radical scavenging capacity was evaluated by the diphenyl-picrylhydrazyl (DPPH) assay. The <i>Ammi visnaga</i> L. seed essential oil showed a low antioxidant capacity. Also in this research, the anti-radical capacity, total phenols and flavonoids of ethanol and aqueous ethanol (70%) extracts from <i>Ammi visnaga</i> seeds were evaluated. The polyphenols contents were spectrophotometrically estimated using the Folin-Ciocalteu method. It showed that the 70% ethanolic extract is more abundant in phenolic compounds than the other extract (48.03 ± 0.59 mg GAE/g dry extract). In the DPPH test, the 70% ethanolic extract of <i>Ammi visnaga</i> seeds showed higher radical scavenging activity ($IC_{50} = 161.32 \pm 1.53 \mu\text{g/mL}$), about 60% of the potency of BHA as reference compound ($IC_{50} = 96.55 \pm 0.47 \mu\text{g/mL}$). The results suggest that <i>Ammi visnaga</i> L. seed extracts could represent a source of molecules with antioxidant potential in the prevention of free radical-related diseases.

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Comparison of phenolic and flavonoid compounds, and the antioxidant activity of two types of extracts of 4 *Althaea officinalis* L. accessions

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ARTICLE INFO	ABSTRACT
Keywords: Physiological <i>Althaea officinalis</i> L. Extraction Secondary metabolite	<i>Althaea officinalis</i> L., belongs Malvaceae family, is thought to originate from various parts of Asia and Europe (Watt <i>et al.</i> , 2007). This plant has antibiotic and anti-inflammatory effects and has been used to treat oral and respiratory tract disorders, chest diseases, and conjunctivitis (Lans <i>et al.</i> , 2007). In this study, the levels of phenolic compounds, flavonoids, anthocyanins, and antioxidant activity of 4 accessions (Khorramabad, Boshroyeh 1, Qazvin, Boshroyeh 2) were evaluated. In addition to accessions, the second factor was the type of extraction, which was investigated as methanolic extract and ethanolic extract. The split-plot experimental design was based on a randomized complete block design. Mean comparison of physiological traits of different accessions showed that the highest phenol content was observed in the Khorramabad and Qazvin accessions, 320.4 and 313.1 µg/g DW, respectively. The extracted amounts of phenol and flavonoids were higher in the ethanol method (499.2 µg/g DW) than methanol method (36.8 µg/g dry matter). Mean comparison of the interaction effect of physiological traits of different accessions × different extraction methods showed that the amount of antioxidant activity in Khorramabad × ethanol (97.92%), Boshroyeh 1 × ethanol (98.41%), and Boshroyeh 2 × ethanol (90.34%) was higher than the other treatments. Overall, the results showed that ethanol extraction resulted in higher extraction of phenolic compounds, flavonoids, and antioxidants from the plant.

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Evaluation the Physiological attributes of basil to application of ascorbic acid and glycine

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ARTICLE INFO	ABSTRACT
Keywords: Ascorbic acid Basil Chlorophyll Glycine Greenness Index	Basil (<i>Ocimum basilicum</i> L.) is a medicinal herb from the mint family (Lamiaceae), widely used in traditional and modern medicine (1). Due to Iran's soil and climate conditions, the nutritional quality of plants has declined, making the foliar application of compounds like ascorbic acid and glycine necessary to improve growth and physiological traits. Ascorbic acid is a water-soluble vitamin and a key antioxidant in plants (2), while glycine is a simple and widely used amino acid in agriculture, commonly found in chelated fertilizers (3). This study evaluated the effects of ascorbic acid and glycine on basil's physiological characteristics in a completely randomized design with nine replications in a greenhouse at Sari Agricultural Sciences and Natural Resources University. The treatments included: two controls (no input and chemical fertilizer only), ascorbic acid (0.5 and 1 g/l), glycine (0.5 and 1 g/l), a combination of ascorbic acid and glycine (each at 0.5 g/l), application of ascorbic acid at 0.5 g/l along with 25% of the chemical fertilizers and glycine at 0.5 g/l along with 25% of the chemical fertilizers. The results showed that greenness index, chlorophyll a, chlorophyll b, total chlorophyll, and carotenoids were significantly affected at the 1% level. The highest values for greenness index (38.2), chlorophyll a (0.456 mg/g), total chlorophyll (0.564 mg/g), and carotenoids (2.153 mg/g) were observed in the treatment with simultaneous application of ascorbic acid and glycine at 0.5 g/l. Chlorophyll b was highest (0.564 mg/g) with glycine foliar application at 0.5 g/l. The lowest values occurred in the control treatments. In general, the findings suggest that integrating chemical nutrition with biological compounds such as ascorbic acid and glycine can be an effective management strategy for improving physiological traits and achieving sustainable production of basil.

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Poster Presentation ID: 1388

Design and Formulation of a nanoemulsion based on *Thymus daenensis* essential oil and *Allium jesdianum* aqueous extract

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ARTICLE INFO

Keywords:

Allium jesdianum

Essential oil

Nanoemulsion

Antibacterial properties

ABSTRACT

In recent years, the development of nanoemulsions has been recognized as an effective method for enhancing the efficiency and stability of herbal compounds. Nanoemulsions are colloidal systems where oil droplets are dispersed in an aqueous phase at the nanometer scale, improving the absorption and penetration of bioactive ingredients. In this study, nanoemulsions containing the essential oil of *Thymus daenensis* and the total aqueous extract of *Allium jesdianum* (Bon-e-sorkh) were prepared using Tween 80 and Span 80 surfactants. Particle size and stability were evaluated over a three-month period. The antibacterial activity of the formulations against *Pseudomonas aeruginosa*, *Escherichia coli*, and *Staphylococcus aureus* standard strains was assessed by determining minimum inhibitory concentrations (MIC) and minimum bactericidal concentrations (MBC). Results demonstrated that the nanoemulsion combining *Thymus daenensis* essential oil with the total aqueous extract of Bon-e-sorkh showed superior antibacterial activity in comparison with nanoemulsion having just the essential oil. However, all stable nanoemulsions inhibited bacterial growth more effectively than the essential oil or extracts alone, especially at lower concentrations. Hemolysis assays indicated minimal toxicity at a concentration of 0.062 mg/mL, and nanoemulsion successfully protected red blood cells against hemolysis. Cytotoxicity evaluation on HUVEC cells revealed that the nanoemulsion had an IC₅₀ of 5 mg/mL. The therapeutic index was calculated to be 625, indicating a highly favorable safety profile. Overall, the nanoemulsion exhibited excellent physicochemical stability over three months and demonstrated potent antibacterial effects, particularly against *Pseudomonas aeruginosa* in the first month (MIC = 0.008 mg/mL). This study could demonstrate the suitability of using different phytochemicals such as essential oil and plant extracts to formulate stable and effective nanoemulsions.



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Effect of different light spectra and Sodium nitroprusside on phytochemical attributes of Borage plantlet

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ARTICLE INFO	ABSTRACT
Keywords: Antioxidant Artificial light Borage Phenol Sodium Nitroprusside	Borage (<i>Borago officinalis</i>) is valued for its applications in traditional medicine, prompting increased attention to its cultivation. Environmental factors such as temperature, light, nutrition, and stress significantly influence the quantity and quality of secondary metabolites (1). Among these, light plays a crucial role. In recent years, the development of light-emitting diode (LED) technology has enabled precise control over light spectra, intensity, and photoperiods based on plant requirements (2). Sodium nitroprusside (SNP) is a chemical compound that, when exposed to light, releases nitrosonium ions (NO⁺), contributing to plant stress resistance (3). This study aimed to investigate the effects of different light spectra in the presence of SNP on the phytochemical properties of borage seedlings. A factorial experiment was conducted in a completely randomized design using horizontal growth shelves. The first factor was light spectrum at 250 $\mu\text{mol m}^{-2} \text{s}^{-1}$ intensity, including R3B1 (three red, one blue LED), R1B3 (one red, three blue), R2B2 (two red, two blue), and full-spectrum (F). The second factor was SNP at two levels: control (distilled water spray) and 500 μM SNP foliar application. The photoperiod was controlled at 16/8 h (light/dark). According to the results, the main effect of light was significant at the 1% level for flavonoids, phenols, and antioxidants. Similarly, the main effect of sodium nitroprusside was significant at the 1% level for phenol and antioxidant content. The interaction effect between light and sodium nitroprusside was significant only for phenol content at the 5% level. The highest phenol content (7.533 mg gallic acid per gram of fresh leaf weight) was observed under the B₁R₃ light spectrum combined with 500 μM SNP. The highest antioxidant activity was recorded under the B₃R₁ light spectrum with 500 μM SNP. Overall, the use of supplemental lighting systems, especially LED technology, is recommended for improving phytochemical traits in borage cultivation.

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Ethnopharmacological and Phytochemical Review of *Tamus communis* L. (Dioscoreaceae): Traditional Uses and Therapeutic Potential

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ARTICLE INFO	ABSTRACT
Keywords: <i>Tamus communis</i> Dioscoreaceae Ethnopharmacology Phytochemistry Medicinal Plants	This research is a library-based review of existing scientific literature, aiming to consolidate ethnopharmacological knowledge and current evidence on the medicinal applications of <i>Tamus communis</i>. <i>Tamus communis</i> L. (syn. <i>Dioscorea communis</i>), a member of the Dioscoreaceae family, is a perennial, herbaceous climbing plant naturally distributed across forests and Mediterranean regions, including Europe, North Africa, the Middle East, and northern Iran. This species is characterized by a thick rhizome (20–30 cm) which has been traditionally applied in folk medicine—particularly in countries such as Bulgaria, Turkey, Iraq, and Iran—for the topical relief of muscular pain, rheumatism, contusions, sciatica, frostbite, and alopecia. These effects are generally attributed to its circulatory stimulation, anti-inflammatory action, and rich content of bioactive compounds. Phytochemical studies have revealed the presence of diverse secondary metabolites in the rhizome, including phytosterols, flavonoids, phenanthrenes, and saponins, all of which have shown anti-inflammatory, antioxidant, antimicrobial, and anticancer properties. Additionally, simple sugars like glucose, fructose, and sucrose have been identified. The yield and composition of these compounds vary depending on solvent type, extraction technique, and harvesting time. Enzymatic assays have demonstrated the inhibitory effects of <i>T. communis</i> extracts on key biological enzymes such as xanthine oxidase (XO), acetylcholinesterase (AChE), butyrylcholinesterase (BChE), and cyclooxygenase-2 (COX-2). These findings suggest promising therapeutic potential in the management of gout, Alzheimer's disease, hypertension, diabetes, and cardiovascular conditions. Topical application remains a preferred route due to enhanced local bioavailability and efficacy. Although preliminary data are encouraging, further pharmacological and clinical studies are required to clarify its mechanisms of action, determine optimal dosages, enhance bioavailability, and facilitate the development of standardized phytopharmaceutical products.

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Poster Presentation ID: 1391

Evaluation the Effects of Different Light Treatments and Ascorbic Acid Foliar Application on Some Physiological and Phytochemical Traits of Basil

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ARTICLE INFO	ABSTRACT
Keywords: Antioxidant Ascorbic Acid Artificial Light Basil Greenness Index	Basil (<i>Ocimum basilicum</i>) is a warm-season crop and a valuable medicinal–culinary herb belonging to the mint family (Lamiaceae) (1). Among environmental factors, light plays the most critical role in influencing plant growth, development, nutrient concentration, gene expression, and enzyme regulation (2). Since this plant faces light deficiency during the cold season, a pot experiment was conducted in 2024 to investigate the response of photosynthetic and phytochemical pigments in basil to different light spectra combined with ascorbic acid foliar application, a small water-soluble molecule with high antioxidant capacity (3). The experiment was laid out as a split-plot based on a randomized complete block design (RCBD) with three replications. The main factor was different LED light spectra, including three blue-to-red ratios (BBBR, BBRR, BRRR) and full-spectrum light (FFFF). The sub-factor was ascorbic acid application at two levels (with and without application). The results showed that ascorbic acid treatment combined with a 50:50 blue-red light spectrum increased the SPAD greenness index by approximately 5% (34.6) compared to full-spectrum light. The highest antioxidant content (83%) was recorded under the 50:50 blue-red light treatment without ascorbic acid. The 75:25 blue-red light spectrum without ascorbic acid led to a 12% increase in phenol content (6.13 mg gallic acid/g fresh leaf weight) compared to full-spectrum light. The highest flavonoid content (2.18 mg gallic acid/g fresh weight) was observed under the 75:25 red-blue light spectrum. However, ascorbic acid treatment did not enhance flavonoid levels. In conclusion, the results indicate that combined red and blue light spectra, particularly when used with ascorbic acid foliar spray, can be recommended for protected and vertical farming of basil.

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Poster Presentation ID: 1392

Localization of the production of raw materials of the rare medicinal plant Vaj (*Acorus calamus*) in Iran

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ARTICLE INFO

Keywords:

Acorus calamus
Cultivation Technology
Mahavaj
Medicinal plants
Vaj

ABSTRACT

Acorus calamus is a perennial, semi-aquatic herbaceous plant belonging to the monocotyledonous class. It is used in the food and perfume industries in addition to its multiple medicinal and health properties [1]. This rare plant species was recently rediscovered in Iran, and its presence was confirmed as a natural plant [2]. Due to the rarity of this valuable medicinal plant, harvesting of this plant from natural habitats will lead to its extinction, so it is necessary to propagate and cultivate it using native Iranian specimens. On the other hand, the raw materials of this medicinal plant for various uses are supplied through imports. During about 6 years of study, the cultivation technology of this plant was localized at the Exire Hyrcany Mahan knowledge-based company (Mahavaj). After 6 phases of cultivation from 1397 to 1403, about 200 thousand seedlings of Vaj were produced for the first time in Iran and transplanted manually in a 5-hectare farm. The average yield of dry rhizome of the wedge plant in the pilot farm is about 4 tons per hectare. The benefits of this project for the country are as follows: 1. Localization of the production of raw materials for this plant in Iran. 2. Making cultivable a rare medicinal native plant of Iran. 3. Helping to protect this rare medicinal plant in Iran by cultivating this plant. Due to the lack of mechanization of cultivation in Iran, its planting and harvesting operations encounter problems. Increasing the area of cultivation and mechanization will not only facilitate the cultivation of this plant but will also increase its economic value.

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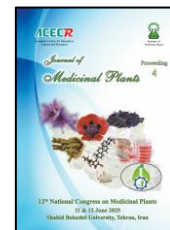
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Enhancing Tobacco Growth and Metabolite Accumulation Through Foliar Phytohormone Treatments

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ARTICLE INFO

Keywords:

Tobacco cultivars
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ABSTRACT

Tobacco (*Nicotiana tabacum* L.), a valuable member of the Solanaceae family, plays an important role in global agriculture and commerce. This study investigated the agronomic and phytochemical responses of three commercial tobacco cultivars—Burley, Virginia, and Basma—to foliar applications of methyl jasmonate (50, 100, 200 μ M) and brassinosteroid (0.25, 0.5, 1, 2 mg/L). A factorial experiment was conducted using a randomized complete block design with five replications under controlled greenhouse conditions. Evaluated traits included leaf number, plant height, fresh and dry leaf biomass, and total phenolic content. Methyl jasmonate significantly increased plant height and leaf number ($P < 0.05$), with Virginia and Basma cultivars showing heightened sensitivity in vertical growth. While no cultivar-specific differences in leaf count were found, brassinosteroid treatments yielded the highest values for both leaf production and plant height across all cultivars, with no significant variation among them. The treatment with 1 mg/L of brassinosteroid in the Burley cultivar resulted in the highest phenolic compound content, while the same treatment led to the greatest fresh and dry leaf yield in the Basma cultivar. These results underscore the potential of phytohormonal treatments to enhance growth and secondary metabolite production in tobacco, providing valuable insights for optimizing cultivar-specific agronomic strategies.

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Evaluation of the effect of consuming the nettle (*Urtica dioica*) extract on the expression levels of inducible nitric oxide synthase in leukocytes

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ARTICLE INFO	ABSTRACT
Keywords: Nettle extract Leukocytes Nitric oxide synthase	A key mediator of inflammation and immune activation is inducible nitric oxide synthase (iNOS), which produces nitric oxide (NO) from L-arginine. This enzyme has an important role in the control of infections caused by intracellular bacterial pathogens such as <i>Mycobacterium tuberculosis</i> and <i>Listeria monocytogenes</i>, the protozoans such as <i>Leishmania</i> and <i>Toxoplasma gondii</i>, and various viruses. Several medical plants have helped to cure infectious diseases. Their natural compounds exhibit antibacterial, antiprotozoal, antiviral, and antioxidant actions. Stinging nettle (<i>Urtica dioica</i>) has a long history of being used as traditional medicine. Extracts from of stinging nettle are used as antiinflammatory remedies in rheumatoid arthritis and other inflammatory diseases. However, its effect on the control of infections is unclear. The aim of this study was evaluation of the effect of consuming the nettle extract on the expression levels of iNOS in leukocytes. Fourteen healthy female Balb/c mice aged 6-8 weeks were divided into two groups. Mice in the first group (treatment group) were orally fed with aqueous nettle extract every day for 30 days. The mice of the second group (control group) were not given the nettle extract. Then, leukocytes were collected from the spleen of mice in the treatment group and control group. Leukocytes were destroyed, their mRNAs were extracted, and the gene expression levels of iNOS were measured by real-time RT-PCR technique. Data analysis using the delta-delta CT method showed that the expression levels of iNOS were significantly increased in leukocytes of the nettle extract treated group compared to the control group ($p \leq 0.05$). These results suggest that the nettle extract can have a potential role in control of infections caused by intracellular pathogens by increasing the expression of iNOS in leukocytes.

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Isolation, purification and structure elucidation of saponin compounds from *Holothuria bacilli* and investigating the effect of extracted compounds on breast cancer cells

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ARTICLE INFO	ABSTRACT
Keywords: Breast cancer Sea cucumber Halostane Saponin <i>Holothuria bacilli</i>	<i>Holothuria bacilli</i>, a species of sea cucumber from the Persian Gulf, is a rich source of bioactive saponins—glycosidic secondary metabolites known for diverse pharmacological properties, particularly cytotoxicity. This study focused on the isolation, purification, structural elucidation, and cytotoxic evaluation of saponins derived from <i>H. bacilli</i> against human breast cancer (MCF-7) cells. The crude extract of <i>H. bacilli</i> was obtained via maceration using a methanol:ethyl acetate (1:1) mixture, followed by solvent partitioning with Kupchan's method (using H₂O, BuOH, CH₂Cl₂, and hexane). Purification of the BuOH and hexane fractions was achieved through column chromatography and MPLC on silica gel. Structures of isolated compounds were elucidated using ¹H and ¹³C NMR spectroscopy. Cytotoxic activity was evaluated via MTT assay, and apoptosis induction was assessed using Annexin V/PI staining on MCF-7 cells. Four compounds (1–4) were isolated and identified: compound 1 as eicosapentaenoic acid, compound 2 as a sapogenin, and compounds 3 and 4 as halostane-type saponins. Compounds 1 and 2 demonstrated potent cytotoxic effects with IC₅₀ values of 30 µg/mL and 3.9 µg/mL, respectively. All four compounds induced apoptosis in MCF-7 cells, with cell death percentages of 31.99%, 52.20%, 99.28%, and 95.62%, respectively. This study confirms the presence of cytotoxic saponins in <i>Holothuria bacilli</i>, with significant apoptotic effects on breast cancer cells. Structural analysis via NMR revealed novel compounds with promising anticancer potential, suggesting the relevance of <i>H. bacilli</i> saponins as candidates for further drug development targeting cancer.

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Poster Presentation ID: 1396

Chitosan Microencapsulation of Enriched Olive Leaf Extracts: Structural Characterization, and Antioxidant Evaluation

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ARTICLE INFO	ABSTRACT
Keywords: Olive leaf extract Polyphenols Chitosan Microencapsulation	Olive leaves, often regarded as agricultural and industrial waste, possess significant potential for economic and medicinal applications due to their abundant phenolic compounds with potent antioxidant activity [1]. These bioactive molecules exhibit numerous health benefits and have attracted significant scientific and commercial interest [2]. This study focuses on the encapsulation of lyophilized olive leaf extract (OLE) using chitosan as wall material, followed by freeze-drying. In this study, <i>Olea europaea</i> leaf extract was prepared by ultrasound-assisted extraction using green solvents. In the following, the phenolic compounds of Leave extract were effectively enriched through a straightforward and efficient method employing macroporous adsorption resin. Then the encapsulation of lyophilized olive leaf extract (OLE) was optimized using chitosan. Fourier transform infrared (FTIR) and Scanning Electrom Microscope (SEM) were used to observe the successful production of microcapsules. The original and encapsulated extracts were then comprehensively analyzed for their polyphenol content and release, using HPLC-DAD, and antioxidant capacity (using DPPH and ABTS methods). The encapsulation efficiency of the key phenolic compounds was systematically evaluated, along with the antioxidant activity and physical properties of the resulting microencapsulated powders. The findings underscore the potential of these microencapsulated extracts for diverse applications in health, nutrition, and pharmaceuticals.

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A Network Pharmacology Approach to Evaluate the Anticancer Mechanisms of Phytochemicals from *Salvia urmiensis*

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ARTICLE INFO

Keywords:

Network Pharmacology
Salvia urmiensis
Anticancer Mechanisms

ABSTRACT

This study applied an integrated network pharmacology approach to explore the potential anticancer mechanisms of phytochemicals derived from *Salvia urmiensis*. Initially, the PharmMapper server was used to predict potential protein and gene targets for each ligand through pharmacophore-based mapping [1]. Subsequently, cancer-associated genes were obtained from the DisGeNET database, and a comparative analysis was conducted to identify overlapping genes between ligand targets and disease-related genes, offering insight into potential molecular interactions [2]. To better understand the interaction landscape, gene–protein interaction networks were constructed using Cytoscape, while protein–protein interaction (PPI) networks were generated via the STRING database. Key hub proteins with high connectivity including: MMP3, CASP7, NOS3, EGFR, ESR1, ESR2 and GSTP1 were identified for downstream analysis. These core proteins were then subjected to functional enrichment analysis, including Gene Ontology (GO) and KEGG pathway mapping, using the DAVID platform. The enrichment results revealed several critical biological processes and signaling pathways potentially modulated by the phytochemicals. Overall, this study provides valuable insights into the molecular basis of the anticancer activity of *Salvia urmiensis* constituents and supports their potential application in cancer therapy.

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Poster Presentation ID: 1399

The Effect of Culture Medium on Somatic Embryogenesis of Drak Genotype of Olive (*Olea europaea* L.)

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ARTICLE INFO	ABSTRACT
Keywords: Olive Callus Somatic embryo Hormone	Olive (<i>Olea europaea</i> L.) is a rich source of valuable nutrients and bioactives of medicinal and therapeutic applications. This study examined the influence of different culture media on callus development, somatic embryogenesis, and root formation in “Drak” genotype of olive. The radicle and a portion of the cotyledon isolated from zygotic embryos were cultured in two types of OMC medium; one containing 2ip at 0.5 mg/l and IBA at 5 mg/l (designated as M1), and the other with 2ip at 2 mg/l and IBA at 5 mg/l (designated as M2). The formation of calli was found to vary based on the type of explant and the culture medium utilized. Following a 21-day period in hormone-free medium, the samples were subsequently transferred to OM medium supplemented with hormones. Both media positively influenced rooting; however, the M1 medium yielded the highest root count among the samples tested. Furthermore, regarding embryogenic characteristics and embryo quantity, M1 was identified as the most effective medium. The lower concentration of 2ip in M1 compared to M2 may have contributed positively to embryo development. The findings indicate that the hormonal composition of the M1 medium achieved an optimal balance, enhancing desirable traits and promoting the growth of healthy embryos.

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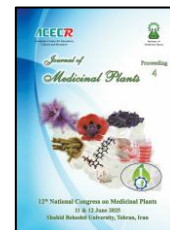
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Poster Presentation ID: 1400

Advanced Strategies for Wound Healing via Medicinal Plant Extracts

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ARTICLE INFO	ABSTRACT
Keywords: Wound Healing Advanced Dressing Carboxymethyl Chitosan Hyaluronic Acid Polyethylene Glycol	Wound healing remains a complex and time-consuming biological process, often hindered by bacterial infections and delayed tissue regeneration. Achieving objectives such as accelerating the healing process, preventing bacterial infiltration, minimizing complications such as excessive scarring, and optimizing patient recovery are crucial in wound management. Traditional wound dressings, including dry dressings, have historically been the primary approach. However, contemporary research highlights that maintaining optimal wound moisture is not detrimental to healing; rather, it enhances tissue repair and reduces scar formation. Across diverse cultures, medicinal plants are utilized not only for therapeutic applications but also for broader health benefits, spanning physical, emotional, and spiritual well-being. Various plant components—flowers, fruits, leaves, branches, bark, roots, and seeds—exhibit pharmacological potential. This study investigates wound healing optimization through bioactive plant extracts integrated into a scaffold system composed of carboxymethyl chitosan, hyaluronic acid, and polyethylene glycol, designed to enhance dressing performance under real-world clinical conditions. The therapeutic and antimicrobial properties of carboxymethyl chitosan and hyaluronic acid—natural biopolymers—have been extensively validated, demonstrating significant improvements in wound healing speed and quality. Carboxymethyl chitosan is a chemically modified derivative of chitosan, synthesized through the introduction of carboxymethyl functional groups. Its intrinsic adhesive interaction with erythrocytes facilitates rapid hemostasis, while its modulatory effects on inflammatory mediators and granulation tissue formation contribute to accelerated wound healing and infection prevention. Hyaluronic Acid, a naturally occurring polysaccharide with critical roles in moisture retention, inflammation regulation, and extracellular matrix stability, interacts with key growth factors such as VEGF, promoting angiogenesis and facilitating endothelial cell migration for neovascularization. Polyethylene glycol (PEG) is a nonionic, biocompatible surfactant employed for plant extracts encapsulation and delivery. Furthermore, PEG enhances scaffold flexibility, serving as a plasticizer, thereby improving dressing adaptability and mechanical resilience in wound care applications.

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Poster Presentation ID: 1401

Phytochemical Comparison of Essential Oil Effluent and Extraction Residue in Two *Achillea* Species from Kashan, Iran

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ARTICLE INFO	ABSTRACT
Keywords: <i>Achillea biebersteinii</i> Afan. <i>Achillea wilhelmsii</i> K. Koch Essential oil Di-terpenoids Pharmacological effects	The genus <i>Achillea</i>, within the Asteraceae family, comprises numerous herbaceous species distributed across temperate regions of Asia and Europe. In Iran, <i>Achillea</i> species, locally known as “Bomadaran”, have a significant presence in traditional medicine, attributed to their various pharmacological effects, including reducing blood pressure and cholesterol, healing and treating wounds, regulating menstrual cycles, and alleviating numerous ailments [1-2]. For this purpose, the aim of the present project is to investigate the active substances (secondary metabolites) present in the effluent from the extraction of essential oil and the extract from its powder residue in two species of yarrow, <i>Achillea biebersteinii</i> Afan. and <i>Achillea wilhelmsii</i> K. Koch, harvested from the Kashan region - Iran. In this project, for the first time, <i>Achillea biebersteinii</i> Afan. and <i>Achillea wilhelmsii</i> K. Koch plants were collected from the Qohroud region - Kashan - Iran and were separately extracted using the hydro-distillation method and a Clevenger apparatus, and then the effluent obtained was stored under appropriate conditions. Subsequently, the powder obtained from the essential oil extraction stage was extracted by digestion and water solvent after drying, and finally, based on the Trease and Evans methods, phytochemical screening of each sample was examined for the presence of bioactive compounds flavonoids, phenols, coumarins, quinones, saponins, tannins, phlobatannins, diterpenoids, xanthoproteins and anthraquinones. The results of this project showed that the effluent from the Clevenger device of the <i>Achillea biebersteinii</i> Afan. plant contains flavonoids, coumarins, tannins and diterpenoids, and the extract obtained from the powder waste obtained from the previous stage contains flavonoids, coumarins and diterpenoids. In contrast, the effluent from the Clevenger plant of <i>Achillea wilhelmsii</i> K. Koch only contained the active ingredient flavonoids, and the extract from its waste also contained flavonoids, phenols, coumarins, tannins, and diterpenoids. Accordingly, considering the biological properties of each of the active ingredients, the secondary metabolites in these two species of <i>Achillea</i> could be a promising method in the treatment of various diseases, especially cancer, which requires further studies and experiments in the future.

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Poster Presentation ID: 1402

Optimizing Extraction and Purification Methods of Glabridin and Glycyrrhizic Acid from *Glycyrrhiza glabra*

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ARTICLE INFO

Keywords:

Glycyrrhiza glabra L
Glabridin
Glycyrrhizic acid
Extraction optimization
Preparative chromatography

ABSTRACT

Licorice with its scientific name *Glycyrrhiza glabra* L. has long been known and appreciated in the traditional medicine of various countries for its numerous the rapeutic properties. Iran is one of the most important producers and exporters of licorice in the world in raw form, but it does not have a significant place in the purification and production of its effective substances, natural products, supplements and medicines. Glycyrrhizic acid and Glabridin are the most important secondary metabolites of licorice. Glycyrrhizic acid, as the most famous effective compound of licorice, has sweetening, anti-inflammatory, liver and stomach protection properties. Glabridin also has anti-oxidant, skin whitening, anti-inflammatory, etc. properties. At first, the extraction of glabridin and glycyrrhizic acid, separately, together and sequentially, was followed in the conditions of ultrasonic bath with different solvents and analyzed by reverse phase liquid chromatography, also the technique of liquid chromatography analysis was improved. Ethyl acetate extract for glabridin and aqueous extract for glycyrrhizic acid were selected as optimal extracts. Then, due to the very low amount of glabridin in the plant and its low concentration in the extract, the ethyl acetate extract was purified by liquid-liquid, hexane and solid phase extraction methods. Solid phase extraction is more suitable than other methods. The samples were analyzed by liquid chromatography coupled to a mass spectrometer, and the peaks of glabridin and glycyrrhizic acid were confirmed in their extracts, and the scale-up conditions were performed from analytical chromatography to preparative chromatography. In the last, purification of glabridin and glycyrrhizic acid was done by preparative chromatography and analyzed by liquid and mass chromatography. The result of the research was that, for the first time, the simultaneous purification of glabridin and glycyrrhizic acid by the organic phase of ethanol was investigated under isocratic conditions, and two of the most important active ingredients of licorice were purified with 98% purity.

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Hydrophilic Electrospun Nanofibers for Targeted Dermal Delivery and Anti-Aging Efficacy

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ARTICLE INFO

Keywords:

Electrospinning
Nanofibers
Collagen
Hyaluronic Acid
Skincare Formulation

ABSTRACT

Electrospinning is an advanced fabrication technique employed to produce continuous fibers with diameters ranging from the micrometer to nanometer scale. This method offers a controlled delivery system that can enhance the bioavailability and therapeutic efficacy of active compounds, particularly in topical applications [1]. The incorporation of collagen and hyaluronic acid into electrospun nanofibers represents a novel approach in skincare formulation, contributing significantly to skin health by promoting hydration, stimulating cellular regeneration, and reducing the appearance of wrinkles. Morphological analysis using scanning electron microscopy (SEM) revealed uniform, bead-free nanofibers with an average diameter of 426 nm, indicating optimal electrospinning conditions. Contact angle measurements confirmed the hydrophilic nature of the nanofibers, with values around 30°, suggesting their suitability for moisture retention on the skin. Cytocompatibility assessments via the MTT assay demonstrated that cell viability remained above 81% at concentrations up to 1000 µg/mL, confirming the material's biocompatibility. Notably, the fabrication process was successfully scaled up, and the resulting nanofiber-based skin mask is currently advancing toward industrial production, underscoring its promising potential for commercial skincare applications.

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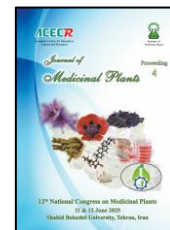
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Poster Presentation ID: 1404

Comparison of Phytochemical Screening of Aqueous Extract and Effluent from Two Species of *Achillea*, *Achillea biebersteinii* Afan. and *Achillea wilhelmsii* K. Koch, Harvested from Kashan region – Iran

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ARTICLE INFO	ABSTRACT
Keywords: <i>Achillea biebersteinii</i> Afan. <i>Achillea wilhelmsii</i> K. Koch Secondary metabolites Flavonoids Cancer treatment	The genus <i>Achillea</i> belongs to the Asteraceae family (also known as Compositae) and has approximately 140 plant species. <i>Achillea biebersteinii</i> Afan. is a perennial plant with yellow flowers, has large flowers and is found in many parts of Iran [1]. This plant is mostly used as a wound healing and healing stimulant, treatment of digestive disorders and tyrosinase enzyme inhibitor. In contrast, <i>Achillea wilhelmsii</i> K. Koch is an exclusive species of Iran and a perennial plant that has herbaceous stems and white leaves without petioles up to a height of 15 to 30 cm and grows widely in different parts of Iran. Its medicinal properties include anti-inflammatory, antihypertensive, antispasmodic, and treatment of some nervous diseases [2]. For this purpose, the aim of the present project is to investigate the secondary metabolites present in the aqueous extract and the resulting effluent of two <i>Achillea</i> species, <i>Achillea biebersteinii</i> Afan. and <i>Achillea wilhelmsii</i> K. Koch, harvested from the Kashan region, Iran. In this project, <i>Achillea biebersteinii</i> Afan and <i>Achillea wilhelmsii</i> K. Koch plants were collected for the first time from the Qohrud region, Kashan, Iran, and were extracted using the water-solvent digestion method. Then, phytochemical screening was determined for the presence of bioactive compounds flavonoids, phenols, coumarins, quinones, saponins, tannins, phlobatannins, diterpenoids, xanthoproteins, and anthraquinones based on the Trease and Evans methods. The results of this project showed that the aqueous extract of <i>Achillea biebersteinii</i> Afan. contains flavonoids, coumarins, saponins, tannins and diterpenoids, and the effluent from it also contains phenols, coumarins, quinones, tannins and diterpenoids. In contrast, the aqueous extract of <i>Achillea wilhelmsii</i> K. Koch contains coumarins, quinones, tannins and diterpenoids and xanthoproteins, and the effluent from it also contains coumarins, saponins, tannins, diterpenoids and xanthoproteins. In this regard, by identifying the active compounds present in the aqueous extract and effluent from these two species of <i>Achillea</i>, <i>Achillea biebersteinii</i> Afan. and <i>Achillea wilhelmsii</i> K. Koch, we can better understand their therapeutic properties and develop new drugs for various diseases, such as cancer treatment.

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Poster Presentation ID: 1405

Production and Yield of the Medicinal Plant *Melissa officinalis* L. in East Azerbaijan Province (Urmia Lake Basin; Pilot Scale)

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ARTICLE INFO

Keywords:

Dry matter yield
Economic year
Harvest index
Lake Urmia
Pilot

ABSTRACT

The Lake Urmia watershed is located in northwest Iran, between the provinces of West Azerbaijan, East Azerbaijan, and Kurdistan. In this region, more than 88 percent of the total volume of water consumed is used in the agricultural sector and placing severe extraction pressure on the rivers supplying water to Lake Urmia. In this regard, cultivating medicinal plants such as lemon balm (*M. officinalis*) with low water requirements and high economic productivity is one of the most appropriate choices for correcting the regional cultivation pattern and reducing pressure on the water resources of the Urmia Lake basin [1]. This research production pilot was carried out with the aim of to determine the production potential and yield of the medicinal plant *Melissa officinalis* in the Urmia Lake watershed in an area of 5,000 square meters. Planting was done by transplanting in rows with a density of 66,000 plants/ha (6.6 plants/m²), April 19, 2021. The distance between rows was 50 cm and the distance between plants on the row was 30 cm. The morphological traits and yield of *M. officinalis* were recorded from 50 plants randomly and in quadrats during the peak of vegetative growth in the field in three years. The studied traits included plant height, canopy, number of secondary branches, and dry matter yield of leaves and plant aerial parts. In the first year, the dry yield of *M. officinalis* aerial parts was 1160 kg/ha and the dry yield of its leaves was 740 kg/ha. The harvest index was 63.7%. The average plant height and canopy diameter were measured to be 36 and 30 cm in the first year, respectively, and the plant had 16 secondary branches. In the second year, two harvests were carried out, the first harvest on June 14 and the second harvest on September 13, 2022. The dry matter yield of *M. officinalis* aerial parts in the second year was 2420 kg/ha and the dry matter yield of leaves was 1580 kg/ha. The harvest index was estimated at 65.3 percent. The average plant height and canopy were measured to be 44 and 39 cm in the second year, and the plant had 21 branches. Trait measurements were estimated from the sum of both harvests. In the third year, the "Economic Year of Plant Growth", there were two harvests, with the second harvest this year being on September 11, 2023. The dry yield of aerial parts of *M. officinalis* in the third year in two harvests was 2600 kg/ha, and the dry matter yield of its leaves and flowers in two harvests was 1620 kg/ha. The harvest index was 62.3 percent. The average plant height and canopy diameter were measured to be 47 and 43 cm in the third year, and the plant had the same 21 branches.

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Impact of *Alhagi maurorum* Extract on Cryopreservation Outcomes of Spermatozoa

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ARTICLE INFO	ABSTRACT
Keywords: <i>Alhagi maurorum</i> Sperm Cryopreservation CASA	Freeze-thawing of avian spermatozoa plays a fundamental role for artificial insemination and genetic conservation purposes. Freezing and thawing tends to cause oxidative damage and structural injury resulting in decreased sperm motility and viability (Khan, Cao et al. 2021). <i>Alhagi maurorum</i>, a medicinal herb known for having anti-inflammatory, antioxidant, antipyretic, analgesic, gastro-intestinal, cardiovascular, diuretic, and dermatological activity. Flavonoids, fatty acids, coumarins, sterols, vitamins, and alkaloids are the active constituents of <i>Alhagi maurorum</i> (Martaza and Hammod 2024). The present experiment was done to determine the impact of the addition of <i>Alhagi maurorum</i> extract on the quality of the sperm after freeze-thawing. Semen was obtained from fertile adult roosters, pooled, and distributed into four groups as follows: a control group without extract and three treatment groups exposed to (10, 20, and 40 µg/mL) <i>Alhagi maurorum</i> extract in the medium of cryopreservation. Post-freeze-thaw, CASA (Computer-Assisted Sperm Analysis) was used to evaluate sperm quality parameters such as total motility (TM%), progressive motility (PM%), curvilinear velocity (VCL), straight-line velocity (VSL), and mean path velocity (VAP). The results revealed that supplementation of the roosters with <i>Alhagi maurorum</i> extract did not show any appreciable differences with regard to sperm motility or kinematic parameters from the control group ($p > 0.05$). While minimal numerical gains were noted in certain treatment groups, these were not statistically significant. The results indicate that under conditions of the present experiment, the extract of <i>Alhagi maurorum</i> did not have a cryoprotective impact on rooster spermatozoa. More detailed investigations employing alternative extraction protocols, higher dosing levels, or combination therapies are required to determine the possible role of <i>Alhagi maurorum</i> in enhancing sperm cryosurvival among avian species.

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Poster Presentation ID: 1407

Production and Yield of the Medicinal Plant *Lavandula Angustifolia* Mill. in West Azerbaijan Province (Urmia Lake Basin; Pilot Scale)

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ARTICLE INFO	ABSTRACT
Keywords: Establishment year Flowering stems Flower yield Leaf area index Lake Urmia	The traditional pattern of cultivating water-intensive crops in the Lake Urmia watershed has always been considered one of the main reasons for the poor water status of Lake Urmia. Considering the traditional cultivation conditions of the region, it is necessary to correct and change the cultivation pattern of the region towards plants with high economic benefits and low water requirements, such as the medicinal plant lavender (<i>Lavandula Angustifolia</i> Mill.), which, While protecting natural areas from the excessive harvesting of these plants and its destructive consequences [1], it can also reduce pressure on the water resources of the Lake Urmia basin. This research production pilot was conducted to determine the production potential and yield of the medicinal plant <i>L. angustifolia</i> in the Urmia Lake basin in an area of 5,000 m². Planting was done by transplanting in rows on April 20, 2020, with a density of 3.1 plants/m². The distance between rows was 80 cm and the distance between plants on the row was 40 cm . Measurement and estimation of the average morphological traits and yield of <i>L. angustifolia</i> flowering stems was done from 50 plants randomly and in quadrats at the time of full flowering in four years. The studied traits included plant height, canopy diameter, number of branches, number of flowering stems, flower and dry leaf yield, and leaf area index. In the first year, which is the year of plant establishment, only plant yield was examined; the yield of dried lavender flowers was 11 kg/ha and the yield of dried leaves was 310 kg/ha. In the second year, the yield of dried flowers was 115 kg/ha and the yield of dried leaves was 1110 kg/ha. The average plant height was measured as 35 cm and the canopy diameter was measured as 30 cm. The average number of branches and flowering stems of the plant reached 9 and 18, respectively. The average leaf area index was also calculated to be 1.5. In the third year, the yield of dried flowers was 275 kg/ha and the yield of dried leaves was 1670 kg/ha. The average plant height and canopy at flowering time were measured to be 44 cm. The average number of branches and flowering stems of the plant reached 18 and 38, respectively. The average leaf area index was also calculated to be 1.85. In the fourth year, the yield of dried flowers was 340 kg/ha and the yield of dried leaves was 1960 kg/ha. The average plant height was 48 cm and the canopy diameter was 53 cm at the time of flowering. The average number of branches and flowering stems of the plant reached 24 and 50, respectively. The average leaf area index was also calculated to be 2.2.

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Poster Presentation ID: 1408

Overcoming Microbial Contamination in Saffron Tissue Culture

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ARTICLE INFO

Keywords:

Crocus sativus

Corm

Pathogen

Contamination

In vitro

ABSTRACT

Saffron (*Crocus sativus* L.) is a triploid plant that does not produce seeds, unlike ornamental and wild species of *Crocus*. Instead, its propagation relies on corms. Natural propagation of saffron is inherently slow, but in vitro culture offers an effective strategy to accelerate this process. However, various pathogens, particularly fungi, can adversely affect saffron corms, leading to corm rot. In this study, fungal and bacterial contamination were identified as primary challenges in saffron tissue culture. To sterilize explants of corms, various disinfectants were employed to eliminate surface and fungal contaminants without damaging the plant tissues. It was essential to strike a balance between controlling contamination and maintaining explant viability, as some surface agents can also harm the tissues. Fungicides and antibiotics were applied at varying concentrations and exposure durations to eradicate fungal and bacterial contaminants. Among the four sterilization protocols evaluated, the most efficient method achieved 90.6% reduction in contamination. This protocol involved several sequential steps: washing with detergent, treating with benomyl (10 g) for 10 minutes, immersing in 0.5% gentamicin for 24 hours, applying 0.3% sodium hypochlorite, using mercuric chloride for 10 minutes, applying silver nitrate, and finally rinsing with 70% ethanol for 20 seconds. This multi-phase approach yielded optimal results in producing contamination-free explants and is proposed as a standardized method for *in vitro* cultivation of saffron.

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Poster Presentation ID: 1409

Effect of *Valeriana officinalis* Extract on the Cryopreservation Outcomes of Spermatozoa

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ARTICLE INFO	ABSTRACT
Keywords: <i>Valeriana officinalis</i> Sperm Cryopreservation Valerian CASA	Ram sperm cryopreservation is a useful means of genetic conservation and artificial insemination program. The freezing-thawing procedure triggers oxidative damage of the sperm membrane, loss of motility, and diminished fertility capacity (Sevilla, Muça et al. 2025). Natural antioxidants have been suggested for the mitigation of these harmful effects. <i>Valeriana officinalis</i> (valerian), a medicinal herb containing various flavonoids, alkaloids, and essential oils, is very well characterized by its antioxidant and membrane-stabilizing capacity (BÂRSAN, PALLAG et al.). The purpose of this study was to investigate the impact of supplementation of <i>Valeriana officinalis</i> on the quality of ram sperm after freezing-thawing. Semen was obtained from healthy adult rams, pooled, and divided into four groups: the control (without extract) and three treatment groups supplemented with 10, 20, and 40 µg/mL of <i>Valeriana officinalis</i> extract in the freezing extender. After cryopreservation and thawing, sperm motility parameters such as total motility (TM%), progressive motility (PM%), curvilinear velocity (VCL), straight-line velocity (VSL), and average path velocity (VAP) were determined using Computer-Assisted Sperm Analysis (CASA). Sperm viability and membrane integrity were also determined. The results showed that supplementation of the extract of <i>Valeriana officinalis</i>, especially at 20 µg/mL, greatly enhanced ($P < 0.05$) post-thaw sperm motility, viability, and membrane integrity as compared to the control group. Antioxidant activity of the extract might have played a role in the decreased oxidative damage incurred during the freeze-thawing process. Overall, the <i>Valeriana officinalis</i> extract revealed effective cryoprotective impacts on sperm of the ram and indicated its application as a natural additive to semen cryopreservation.

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Poster Presentation ID: 1410

Secondary Metabolites and Antioxidant Activity of Vegetative and Reproductive Parts of the Medicinal Plant, *Smyrniun cordifolium* Boiss.

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ARTICLE INFO

Keywords:

Medicinal Plant
Smyrniun cordifolium
Secondary Metabolites
Antioxidant
Zagros Mountains

ABSTRACT

Understanding the variety of plant species that grow across different habitats is essential for promoting sustainable development in any region. *Smyrniun cordifolium*, a medicinal and edible plant belonging to the Apiaceae family, is native to Iran and naturally occurs in the western and southwestern parts of the country. The growth and performance of plants in their habitats and ecosystems are influenced by multiple factors such as altitude, plant species, regional climate, geographic location, and soil characteristics. This research seeks to examine the levels of specific secondary metabolites and assess the antioxidant capacity of extracts derived from both the vegetative and reproductive tissues of *S. cordifolium* in habitats located in Lorestan and Ilam provinces. Samples of the plant's vegetative and reproductive parts were collected from two sites; Kabirkouh in Ilam Province and Oshtorankouh in Lorestan Province. After drying the samples in the shade, extracts were prepared using 80% methanol. The total phenolic content was measured via the Folin-Ciocalteu method, and flavonoid content was determined using an aluminum chloride colorimetric assay. Antioxidant activity was evaluated by measuring the ability to neutralize DPPH free radicals (2,2-diphenyl-1-picrylhydrazyl). The experiment was designed as a fully randomized trial with three replications. Analysis showed significant differences ($p < 0.05$) in the total phenolic and flavonoid contents, as well as antioxidant activity (indicated by IC_{50} values), between the plant's different growth stages, parts, and collection sites. The reproductive portions of *S. cordifolium* from Kabirkouh contained higher levels of phenolics and flavonoids than other samples. Furthermore, in antioxidant testing using the DPPH method, reproductive tissues from Kabirkouh exhibited lower IC_{50} values, indicating stronger antioxidant activity, which correlated with their higher phenolic and flavonoid contents.

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Poster Presentation ID: 1411

Effects of Various Developmental Stages on Secondary Metabolites Content and Antioxidant Activity of *Hypericum scabrum* and *H. perforatum*

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ARTICLE INFO

Keywords:

Vegetative Parts
Reproductive Parts
Antioxidant Capacity
Medicinal Plant
Secondary Metabolite

ABSTRACT

Hypericum, a genus within the family Hypericaceae which encompasses over 400 species worldwide, is well-distributed in the Mediterranean and Near Eastern regions, as well as in tropical and subtropical areas, and widely spreads across Europe, Asia, Africa, and North America. The aim of this study is to evaluate the effects of different developmental stages on the levels of certain secondary metabolites and on antioxidant activity in *Hypericum scabrum* and *H. perforatum* collected from western Iran. The vegetative and reproductive parts of samples from Lorestan and Ilam provinces were collected, shade-dried, and used to prepare methanol extracts. The total phenolic and flavonoid content were measured using the Folin- Ciocalteu method and the aluminum chloride colorimetric method, respectively. Antioxidant activity of the extracts, was measured by assessing the radical scavenging capacity using the stable radical 2,2-diphenyl-1-picrylhydrazyl (DPPH). Statistical analysis was conducted using SPSS software, and the comparison of means was performed using Duncan's test. The total phenolic content in reproductive parts of *H. perforatum* from Ilam and Lorestan was 7.53 ± 1.01 and 7.07 ± 0.21 mg GA/g dw, while the total flavonoid content in the vegetative parts (leaves) was 2.63 ± 0.11 and 2.27 ± 0.21 mg QUE/g dw. The highest antioxidant activity (lowest IC₅₀ value) was observed in reproductive part of *H. perforatum* from Ilam (70.73 ± 4.13 mg/mL), whereas the lowest activity (highest IC₅₀) was recorded in vegetative parts (flowers) from Lorestan (101.89 ± 5.43 mg/mL). The results indicated a significant difference in antioxidant activity depending on environmental conditions and plant parts. Higher values in the Ilam site are attributed to its lower altitude and higher average temperature relative to Lorestan, which may cause the plants to produce higher levels of secondary metabolites to deal with environmental stresses.

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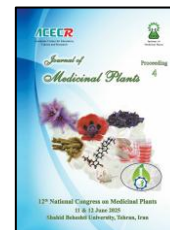
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Poster Presentation ID: 1412

The effect of different developmental stages on the amount of secondary metabolites and antioxidant activity of sympatric plants; *Nectaroscordum tripedale* and *Allium jesdianum*

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ARTICLE INFO	ABSTRACT
Keywords: Developmental Stage Secondary Metabolite Sympatric <i>Allium jesdianum</i> Flavonoid	Two species of plant, <i>Nectaroscordum tripedale</i> and <i>Allium jesdianum</i>, are native to Iran. These species grow wild and spontaneously in the Zagros mountain range in western and southwestern Iran. Both plants possess significant nutritional and medicinal value and have been utilized by local communities from ancient times to the present. The aim of this study was to investigate the effects of different developmental stages on the levels of certain secondary metabolites and antioxidant activities of the <i>Nectaroscordum tripedale</i> and <i>Allium jesdianum</i>, collected from the Kabirkouh in the south of Ilam Province. Following the collection of the vegetative and reproductive parts of these plants, samples were air-dried in the shade, and extracts were prepared using a methanolic extraction method. Total phenolic content, total flavonoid content, and antioxidant capacity measured via the Folin-Ciocalteu method, aluminum chloride colorimetric assay, and DPPH assay (using IC₅₀ values), respectively. Statistical analyses were performed using SPSS software, with multiple comparison tests (Duncan's test) employed for mean comparisons. The results demonstrated that the vegetative parts (stems and leaves) of <i>A. jesdianum</i> and <i>N. tripedale</i> yielded the highest extractability (approximately 5.47 and 4.55 grams of extract per gram of dry matter, respectively), and exhibited the highest levels of total phenolics (18.43 ± 2.81 and 16.51 ± 3.01 mg Gallic acid per gram of dry weight, respectively) and total flavonoids (4.93 ± 0.92 and 3.87 ± 1.02 mg Quercetin per gram of dry weight, respectively). Furthermore, these vegetative parts in both species also demonstrated highest antioxidant capacity (lower IC₅₀ values). The findings indicate a direct relationship between secondary metabolite synthesis and antioxidant activity. Based on these results, it is recommended that the vegetative parts and developmental stages of these plants, particularly those with higher secondary metabolite content, be prioritized for collection and utilization to optimize antioxidant benefits.

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Poster Presentation ID: 1413

Antibacterial Activity of *Berberis vulgaris* L. Methanolic Extract against *Streptococcus mutans*

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ARTICLE INFO

Keywords:

Antibacterial activity
Medicinal plants
Dental caries

ABSTRACT

Dental caries, affecting approximately 44% of the global population, represents a prevalent chronic condition driven by cariogenic bacteria, notably *Streptococcus mutans*, within oral biofilms. The increasing prevalence of antibiotic resistance and the limitations of fluoride-based treatments underscore the need for novel antimicrobial strategies. This study evaluates the antibacterial efficacy of *Berberis vulgaris* L. fruit extract against *S. mutans*, a primary caries-associated pathogen. Methanolic extracts of *B. vulgaris* were prepared using a Soxhlet apparatus and tested against one reference strain (ATCC 1683) and four clinical isolates of *S. mutans* obtained from Iranian patients. Three antimicrobial assays—disk diffusion, minimum inhibitory concentration (MIC), and minimum bactericidal concentration (MBC)—were conducted. Data were analyzed using SPSS version 26, with one-way ANOVA applied to assess growth inhibition zones. Results from the disk diffusion assay demonstrated that *B. vulgaris* extract exhibited inhibitory activity against *S. mutans*, with bacterial sensitivity observed at a concentration of 0.125 mg/mL. Increasing extract concentrations correlated with enhanced antimicrobial effects, showing a significant difference in inhibition zone diameters across four concentrations ($P < 0.001$), with the greatest effect observed at 1 mg/mL. The MIC assay indicated that the methanolic extract inhibited bacterial growth at concentrations ranging from 0.4 to 0.9 µg/mL, with MBC values ranging from 0.2 to 0.4 µg/mL. These findings suggest that *B. vulgaris* L. extract holds promise as a plant-based antimicrobial agent for combating *S. mutans* and addressing dental caries, offering a natural alternative to conventional treatments amid concerns over antibiotic resistance and fluoride limitations.

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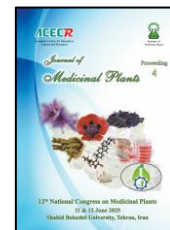
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Poster Presentation ID: 1414

Development of Corn Silk Extract and Vitamin C Co-loaded Nanoliposomes Coated Cationic Zein: A strategy for enhancing the stability and bioavailability

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ARTICLE INFO	ABSTRACT
Keywords: Corn silk Vitamin C Zein Natural Antioxidants Supplements	Corn silk (CS), a by-product generated during corn harvesting, is regarded as agricultural waste, and a large amount is accumulated annually (Kaur et al., 2023). Nevertheless, it is a valuable source of bioactive compounds that exhibit strong antioxidant activity, thereby offering potential for use in food supplements and functional beverages. Corn silk's (CS) remarkable therapeutic potential for disease treatment is related to the diverse range of bioactive compounds such as flavonoids, phenolic acids, steroids, alkaloids, volatile oils, saponins, and tannins (Žilić et al., 2016). In recent years, natural antioxidants have been noticed as potential alternatives to synthetic ones (Chen et al., 2016). Extensive research has emerged, exploring the efficacy and applications of these bioactive compounds in various industries, including food, cosmetics, and pharmaceuticals. In this study, corn silk extract (CSE) and vitamin C were co-encapsulated into nanoliposomes, yielding particles with an average diameter of 86.58 nm, 0.34 ± 0.05 PDI, and a zeta potential of -22.9 mV. These nanoliposomes were subsequently coated with the protein of corn, which is named zein. The physical stability of the zein-coated nanoliposomes was evaluated over 28 days through measurements of particle size and zeta potential. Surface coating has been shown to enhance both the physical and oxidative stability of nanoliposomes (NLPs), as well as the physical stability of the encapsulated compounds. Fourier-transform infrared (FT-IR) spectroscopy analysis confirmed the presence of interactions among CSE, vitamin C, the phospholipid bilayer, liposomes, and the coating material. Scanning electron microscopy (SEM) demonstrated the presence of uniform spherical structures, whereas transmission electron microscopy (TEM) confirmed the development of core-shell morphology. The encapsulation efficiency of CSE and Vitamin C inside the NLPs were $82\% \pm 3.9$ and 77.2 ± 5.2 % respectively. The release behavior evaluated under simulated gastrointestinal conditions. The zein-coated nanoliposomes demonstrated sustained release than uncoated liposomes. Accordingly, the obtained results indicate that the prepared stable zein-coated nanoliposomes exhibit significant potential for utilization in food industry applications.

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Poster Presentation ID: 1415

Optimizing Extraction and Purification Methods of opium alkaloids in *Papaver somniferum* plants

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ARTICLE INFO

Keywords:

OPIUM

HILIC Column

Alkaloids

Papaver somniferum

Chromatography

ABSTRACT

Opium, the dried latex obtained from the unripe capsules of *Papaver somniferum*, has long been valued in traditional medicine for its analgesic, antitussive, and gastrointestinal properties. Today, due to its content of bioactive alkaloids—particularly morphine, codeine, thebaine, noscapine, and papaverine—it holds significant importance in the pharmaceutical industry. However, one of the major challenges in the medicinal application of opium is the contamination with heavy metals, especially lead, which has been detected in several domestically sourced samples and poses serious health concerns. In this study, an efficient method was developed for the extraction, purification, and identification of key opium alkaloids along with effective lead removal. Initially, the extraction process was optimized using organic solvents. Subsequently, high-performance liquid chromatography (HPLC) was employed for separation of the target compounds. For polar alkaloids such as morphine, codeine, and thebaine, a hydrophilic interaction chromatography (HILIC) column was used. This column enables direct analysis of polar compounds without the need for derivatization and offers full compatibility with mass spectrometry, thus improving analytical precision and reducing matrix interference. Chromatographic parameters, including mobile phase composition, ammonium acetate buffer concentration, and pH, were optimized to enhance resolution and shorten analysis time. Furthermore, the optimized method was successfully scaled up to a semi-preparative HPLC column to allow for greater recovery and purification of active alkaloids. The results demonstrated that the optimized conditions are transferable from analytical to semi-preparative scale, enabling efficient isolation of bioactive compounds while removing lead contaminants. Finally, qualitative and quantitative identification of the alkaloids was achieved using LC-MS. The developed method provides a reliable framework for the production of safe, plant-derived pharmaceuticals.

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Poster Presentation ID: 1417

Enhancing Ginger Growth with Phosphate-Solubilizing Biofertilizers

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ARTICLE INFO	ABSTRACT
Keywords: Ginger (<i>Zingiber officinale</i>) Sustainable agriculture Biofertilizers Rhizome yield Inoculation	Ginger (<i>Zingiber officinale</i>), an important medicinal and spice plant, has various applications in the food and pharmaceutical industries. Phosphorus plays a vital role as one of the essential elements in the growth and development of plants, and its deficiency can lead to reduced plant growth. Several studies have reported the positive effects of inoculating plants with phosphate-solubilizing bacteria on growth and yield components of rhizomes in plants. Therefore, a factorial experiment based on a completely randomized design was conducted on ginger plants (Chinese cultivar). The factors included: phosphate-solubilizing bacteria of the genus <i>Pseudomonas</i> (codes A and B), a combination of two <i>Pseudomonas</i> species (A + B), and phosphate-fertilizing biofertilizer (commercial). For this experiment, the rhizomes were inoculated with the aforementioned bacteria for one hour and then transferred to a soil culture medium. The experiment was conducted over a period of 8 months. Some parameters, including stem length, stem diameter, number of stems, number of leaves, fresh and dry weight of rhizomes, and the Spad index, were measured. The results showed that the highest values of stem length (106 cm), stem diameter (16 mm), fresh and dry weight of rhizomes (134.8 and 24.6 g), and Spad index (19.2) were obtained from the phosphate biofertilizer treatment. However, the highest number of stems per pot (6) and number of leaves (76) were observed in <i>Pseudomonas</i> (code A). Overall, the results of this study indicated that inoculating rhizomes with phosphate biofertilizer led to optimal growth traits and rhizome yield in ginger plants.

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Poster Presentation ID: 1418

Effect of the biostimulant Ecoquel FMZ[®] on growth parameters of arugula (*Eruca vesicaria* subsp. *sativa*)

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ARTICLE INFO	ABSTRACT
Keywords: Fertilizer Rocket plant Spraying Shoot weight Root weight	<i>Eruca vesicaria</i> subsp. <i>sativa</i> (rocket or arugula) is an economically important leafy vegetable cultivated primarily in the Mediterranean region, southern Europe, and Central Asia [1]. Beyond its culinary uses, arugula is valued for its medicinal properties, with plant and seed extracts demonstrating various therapeutic potential [2]. This study investigated the effects of the biostimulant Ecoquel FMZ[®] (applied at 2kg/1000L) on arugula growth under greenhouse soil cultivation. The fertilizer composition included free amino acids (6%), Fe (6%), Mn (3%), and Zn (4%). A single foliar application was performed on arugula plants one day after the second harvest. Growth parameters, including leaf number, plant height (cm), shoot fresh weight (g), shoot dry weight (g), root fresh weight (g), and root dry weight (g), were evaluated 10 days post-treatment. The experiment was arranged in a completely randomized block design with ten replicates per treatment. Treated plants showed significantly higher values (t-test, $P < 0.05$) in all growth parameters compared to controls. Specifically, treated plants showed values of 29.10 ± 2.43 (leaf number), 13.35 ± 0.42 cm (plant height), 12.33 ± 0.21 g (shoot fresh weight), 1.19 ± 0.02 g (shoot dry weight), 4.63 ± 0.15 g (root fresh weight), and 0.55 ± 0.02 g (root dry weight). In contrast, control plants demonstrated values of 4.00 ± 0.56, 9.50 ± 0.44 cm, 9.49 ± 0.15 g, 1.06 ± 0.02 g, 2.90 ± 0.11 g, and 0.50 ± 0.02 g, respectively. These findings indicate that Ecoquel FMZ[®] significantly enhances arugula growth, suggesting its potential as an effective biostimulant for this medicinal crop.

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Poster Presentation ID: 1419

Isolation and Purification of Neuroprotective Compounds from *Boswellia sacra* Resin Using a Bioactivity-Guided Fractionation Approach for Alzheimer's Disease Intervention

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ARTICLE INFO	ABSTRACT
Keywords: Alzheimer's disease <i>Boswellia sacra</i> L 3-acetyl-11-keto-β-boswellic acid (AKBA) antioxidants Metal chelation	Alzheimer's disease (AD) is a progressive age-related neurodegenerative disorder characterized by memory loss, cognitive impairments, elevated oxidative stress, neuroinflammation, and abnormal accumulation of metal ions in brain tissues [1]. Compounds present in the resin of <i>Boswellia sacra</i>, particularly 3-acetyl-11-keto-β-boswellic acid (AKBA), have shown considerable potential in modulating the pathogenesis of AD due to their potent antioxidant properties, anti-inflammatory effects, and metal chelating capabilities [2]. In this study, <i>B. sacra</i> resin was extracted using 70% methanol. The antioxidant activity of the crude extract was evaluated using DPPH and ABTS radical scavenging assays, yielding 61.0% and 62.0% inhibition, respectively [3]. Zinc ion (Zn^{2+}) chelation was also assessed, with the crude extract exhibiting a chelation capacity of 31.89%. Preliminary phytochemical profiling was performed via thin-layer chromatography (TLC), followed by column chromatography using a silica stationary phase and a gradient mobile phase from n-hexane to ethyl acetate. Seven fractions (A–G) were collected and analyzed by TLC; fractions with similar profiles were combined for further analysis [3]. In the following, the obtained fractions were tested for their biological activities, including antioxidant capacity and metal chelating ability (Fe^{2+}, Zn^{2+}) [3]. Metal chelation assays revealed that fractions A and D exhibited the highest Zn^{2+} chelation activity (68.85%), followed by fraction E (63.0%). For iron (Fe^{2+}) chelation, fraction B showed 46.0% activity, while fractions E and the B+E combination demonstrated 42.5% and 43.5%, respectively. The most bioactive fractions were subjected to high-performance liquid chromatography (HPLC) for constituent identification [3]. Further characterization of the active compounds using advanced spectroscopic and structural elucidation techniques is currently underway to define their molecular identity and bioactivity correlations. These findings highlight the therapeutic potential of <i>B. sacra</i>-derived phytochemicals as plant-based neuroprotective agents. The bioactivity-guided isolation approach presented here provides a robust foundation for future studies exploring the mechanistic roles of these compounds in cellular models of Alzheimer's disease [1,2].

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Poster Presentation ID: 1420

Investigating the mechanism of flaxseed in pain control

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ARTICLE INFO	ABSTRACT
Keywords: Flaxseed Network analysis Analgesic Bioinformatics	Despite flaxseed's (<i>Linum usitatissimum</i>) well-documented analgesic properties is available (1), its molecular mechanism remains unclear. This study aimed transcriptome gene expression data assessment via protein-protein interaction (PPI) network analysis to identify key mechanisms underlying flaxseed's analgesic effects. Gene expression profile of flaxseed-treated samples was obtained from the GEO database and analyzed using the GEO2R program. In the other hand, pain-related data were obtained from the GeneCards database. PPI network was constructed and analysed using the Cytoscape software to find the pain related hubs. The shared hubs and significant DEGs were identified as the critical genes which are involved in the analgesic property of flaxseed. RAF1 determined as hub-bottleneck gene which undergoes downregulation following flaxseed consumption. ERK-MEK signaling pathway suppression will be the final outcome of RAF1 downregulation which leads to flaxseeds analgesic effect. This study integrates gene expression and protein interaction to propose flaxseed as a potential analgesic therapy, though further research is needed to elucidate precise mechanisms.

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Poster Presentation ID: 1421

Genotypic Variation in Polyphenols of Minudasht Olive Collection: A Comparative Phenolics and Flavonoids Profiling of High and Low Extremes

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ARTICLE INFO	ABSTRACT
Keywords: Olive fruit Polyphenol profile Oleuropein Hydroxytyrosol	Olive (<i>Olea europaea</i> L.) is one of the most significant oil-producing trees, traditionally cultivated in Mediterranean countries such as Spain, Italy, Tunisia, Iran, and Greece. Today, due to its well-documented health benefits and the increasing global demand for olive oil, its cultivation has expanded to various regions with diverse environmental conditions. Olive is particularly valued for its secondary metabolites such as fatty acids, phenols, flavonoids, oleuropein, tyrosol, and hydroxytyrosol (HT) which contribute significantly to its health-promoting properties. This study aimed to determine the genotypic variation in polyphenolic compounds of Minudasht Olive Collection at 150 and 180 days after flowering (DAF) over two years. Each sample (1 g) was powdered using liquid nitrogen, extracted with 5 mL of 80% methanol-water solution, sonicated in an ultrasonic cleaner at room temperature for 30 minutes, centrifuged, and the supernatant was collected. Spectrophotometric analysis revealed significant variation in polyphenolic content across different olive genotypes and between harvest seasons. Total polyphenol concentrations ranged from 0.56 mg/g to 28.22 mg/g of fruit in the first season, and from 3 mg/g to 35 mg/g of fruit in the second season. Furthermore, HPLC-based profiling of samples with extreme high and low polyphenol levels demonstrated notable differences in both the composition and quantity of polyphenolic compounds. These findings indicate a direct relationship between genotype and the content and diversity of polyphenolic compounds. This highlights the potential of each genotype as a natural sources of bioactive compounds, and offering their promising applications in different field.

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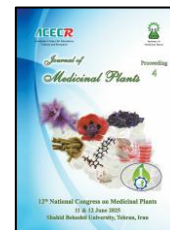
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Poster Presentation ID: 1422

The Effect of Two Host Species in Different Seasons on Some Medicinal Bioactive Compounds in Mistletoe (*Viscum album* L.)

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ARTICLE INFO

Keywords:

Harvesting season
Host species
Hyrcanian forest
Triterpene acids
Viscum album L.

ABSTRACT

Mistletoe (*V. album*) from Santalaceae family is a known pharmaceutical plant that has cytotoxic effect and induces apoptosis. *V. album* extract containing triterpene acids have been widely used for decades as an alternative treatment and adjuvant remedy in cancer therapy. This parasitic plant grows on various tree species as well as some endemic and native species of Hyrcanian forests of Iran such as *Parrotia persica* C.A.Mey. (Persian ironwood) and *Carpinus betulus* L. (Hornbeam). The aim of this study was to compare the amount of triterpene acids including oleanolic acid (OA), betulinic acid (BA) and ursolic acid (UA) in mistletoes settled on *Parrotia persica* and *Carpinus betulus* as hosts in different seasons with different phenological stages. In this study, mistletoes were collected from three bases of each host species (three replicates with the same ecological condition) in spring (May), summer (August), autumn (November) and winter (February) in Daeiz forest of Hyrcanian forests of Iran. The samples were extracted with ethyl acetate and analyzed by high performance liquid chromatography. The results indicated that OA was the dominant triterpene acid and its amount was higher than BA in the both host species and all seasons. UA was not detected in any sample. The highest content of OA (12.38 mg/g dry weight) with significant difference was observed in *V. album* settled on the *Parrotia persica* in summer season. On the other hand, the lowest amount of OA (5.58 mg/g dry weight) was found in mistletoe grown on *Carpinus betulus* in winter. The highest amount of BA (1.68 mg/g dry weight) was detected in mistletoe on *Parrotia persica* in summer and the lowest amount of this compound (0.49 mg/g dry weight) was found in the mistletoe from *Carpinus betulus* in autumn. This research showed that the content of OA and BA in *V. album* depends on the harvesting time and also the host species. The highest amount of the investigated compounds was found in mistletoes settled on *Parrotia persica* in summer, which seems to be optimal for attainment of plant material rich in triterpene acids.

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Poster Presentation ID: 1423

The Effect of Putrescine and Phenylalanine on Morphological Traits, Chlorophyll, Carotenoid, and Total Sugar Content in *Datura stramonium* L.

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ARTICLE INFO	ABSTRACT
Keywords: Putrescine Phenylalanine Datura Stramonium L. Carotenoids Total sugars	This study aimed to investigate the effects of the foliar application of putrescine and phenylalanine on the morphological and biochemical characteristics of <i>Datura stramonium</i> L. The experiment was conducted as a factorial design in a completely randomized arrangement with three replications under greenhouse conditions. Treatments included putrescine (0, 50, and 100 mg/L) and phenylalanine (0, 75, and 150 mg/L). Morphological traits (plant height, number of branches, stem diameter, fresh and dry weight) and biochemical parameters (chlorophyll <i>a</i> , <i>b</i> , carotenoids, and total sugars) were measured. The highest plant height (33.66 cm) and dry weight (5.86 g) were observed in the 100 mg/L putrescine treatment. Chlorophyll content was highest in the control group (7.20 mg/g fresh weight), while carotenoids significantly increased with 50 mg/L putrescine (5.60 mg/g). Total sugar content was highest in the control (3.52 mg/L). Putrescine and phenylalanine, as growth stimulants, can enhance the growth and quality of <i>Datura stramonium</i> by improving nutrient uptake and regulating secondary metabolism.

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Poster Presentation ID: 1424

Chromosome numbers and karyotype features of eight accessions of bitter and sweet *Asafoetida* of Kerman

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ARTICLE INFO	ABSTRACT
Keywords: Asafoetida Chromosome Karyotype	Asafoetida (<i>Ferula assa-foetida</i>) is Iranian endemic medicinal plant from Apiaceae family distributed in various geographical regions all over of the country [1]. The importance of Asafoetida is due to the presence of gum that is extracted from the root [2]. This study represents chromosomal data eight accessions of bitter and sweet Asafoetida of Kerman province. The karyotype analysis in this research was performed using the squash technique on mitotic metaphase chromosomes. Solution of 1% Bromonaphthalene was used for pretreatment. The specimens were then treated with carnoy I fixative solution for 24 hours. Haematoxylin was used for staining the chromosomes (for 3 hours). Karyotype analysis determined that all accessions were diploid with chromosome number $2n = 2x = 22$. The mean chromosome length of accessions was $2.82\mu\text{m}$. Maximum and minimum chromosome length was for K3 ($3.23\mu\text{m}$) and K5 ($2.55\mu\text{m}$) accessions, respectively. All the studied accessions showed predominance of metacentric and submetacentric chromosomes, with a low proportion of subtelocentric and subtelocentric pairs.

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Poster Presentation ID: 1425

Analysis of Environmental Effects on Phytochemical Composition and Antioxidant Activity of *Stachys byzantine*

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ARTICLE INFO

Keywords:

Chlorogenic
Lamiaceae
Mountain Tea
Phenol

ABSTRACT

Stachys is a large genus of the mint family (Lamiaceae) with over 300 species found across most regions of the world, except for Australia and New Zealand [1]. *Stachys byzantina* holds notable significance for its therapeutic applications, particularly in addressing inflammatory conditions [2]. The aerial parts of the plant are commonly used in various forms, including infusions, oils, and supplements [3]. The aim of this study was to investigate the phytochemical diversity in different populations of *S. byzantina* in the Ardabil province. In this study, the antioxidant activity of the samples was evaluated using the DPPH (2,2-Diphenyl-1-picrylhydrazyl) assay. Total phenolic content (TPC) was determined by the Folin–Ciocalteu method, and total flavonoid content (TFC) was measured using the aluminum chloride colorimetric method. Phytochemical compounds were identified and analyzed using High-Performance Liquid Chromatography (HPLC). The results revealed that the highest concentration of chlorogenic acid and TPC was found in specimens from Heyran and Sardabeh, respectively. The greatest Antioxidant and TFC in Fandoghlu. These differences were directly linked to the distinct ecological conditions in each region, highlighting the impact of environmental factors on secondary metabolite production. The findings provide a valuable basis for developing breeding programs and pharmaceutical applications of *S. byzantina*.

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Poster Presentation ID: 1426

The Effect of Putrescine and Phenylalanine on the Phenolic Compounds of *Datura stramonium* L.

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ARTICLE INFO	ABSTRACT
Keywords: Putrescine Phenylalanine Datura Stramonium Phenolic compounds	Medicinal plants play a significant role in the pharmaceutical and food industries due to their phenolic compounds. Phenolic compounds, as potent antioxidants, are effective in preventing various diseases and improving human health. This study investigated the effects of putrescine and phenylalanine as growth stimulants on the phenolic compounds of <i>Datura stramonium</i> L. The experiment was conducted as a completely randomized design under greenhouse conditions. In three stages, different putrescine treatments (0, 50, and 100 mg/L) and phenylalanine (0, 75, and 150 mg/L) were applied as foliar sprays. After harvesting the plants, the levels of phenolic compounds were measured using the Folin-Ciocalteu and aluminum chloride methods. The results showed that the interaction between putrescine and phenylalanine significantly affected the phenolic compounds. The highest total phenol content (39.698 mg/DW) was observed in the treatment with 0 mg/L putrescine and 75 mg/L phenylalanine. These results indicate that putrescine and phenylalanine can act as effective stimulants in increasing the production of phenolic compounds in <i>Datura stramonium</i>.

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Poster Presentation ID: 1427

Optimization of Callus Culture Conditions in *Salvia hydrangea* for Enhanced Biomass and Tissue Quality Toward Metabolite Production

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ARTICLE INFO	ABSTRACT
Keywords: Callus Culture Sag Plant Growth Regulators (PGRs) Secondary Metabolites	Plants play a vital role in various industries due to their unique chemical compounds. However, they face serious threats such as extinction and genetic erosion, which endanger their survival and sustainable use. In response, in vitro culture techniques have attracted considerable attention as effective strategies for the conservation and biotechnological exploitation of valuable plant resources. In this study, we aimed to optimize the callus culture conditions of <i>Salvia hydrangea</i> DC. ex Benth (Lamiaceae), a medicinal plant known for its antioxidant and anti-inflammatory properties, to enhance the production of its specialized metabolites. Four plant growth regulators (PGRs)—2,4-Dichlorophenoxyacetic acid (2,4-D), Indole-3-butyric acid (IBA), 6-Benzylaminopurine (BAP), and Kinetin (Kin)—were tested individually at a concentration of 2 mg/L in separate culture media. Each treatment was evaluated in five replicates, alongside a hormone-free control group. Over a six-week culture period, weekly observations were made to assess both quantitative traits (e.g., callus biomass) and qualitative characteristics (e.g., color, firmness, and tissue texture). By the sixth week, all treatments showed increased callus biomass, with BAP and NAA treatments producing the highest biomass (~18 mg). These two hormones also significantly improved tissue quality, yielding soft, white calli. Analysis of variance (ANOVA) confirmed a statistically significant correlation between culture duration and biomass increase ($p < 0.01$). These findings highlight the effectiveness of BAP and NAA in optimizing callus induction and quality, supporting their use in biotechnological applications focused on metabolite production from <i>S. hydrangea</i>.

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Poster Presentation ID: 1428

Aromatherapy is an effective method for reducing anxiety and pain, as well as improving women's health

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ARTICLE INFO

Keywords:

Aromatherapy

Rosa damascena

Essential oil

Mental health

Anti-inflammatory

properties

Complementary medicine

ABSTRACT

Inhalation is regarded as one of the most popular and safest methods for administering essential oils. It is an effective approach to altering emotions or mental states and is widely applicable in the treatment of physical or psychological disorders as well as other functions regulated by the autonomic nervous system. Aromatherapy, as a complementary therapeutic modality, has been traditionally utilized in various cultures to enhance both physical and mental well-being (1). *Rosa damascena* essential oil holds a special place in this field due to its unique chemical constituents, including citronellol, geraniol, and phenylethyl alcohol (2). The present study aims to investigate the chemical mechanisms and physiological effects of *Rosa damascena* essential oil in aromatherapy, with a particular focus on its clinical applications in reducing anxiety, improving sleep quality, and alleviating depressive symptoms. Research findings suggest that rose aromatherapy may exert anxiolytic and calming effects by stimulating the limbic system and regulating the hypothalamic-pituitary-adrenal axis. Additionally, the anti-inflammatory and antioxidant properties of its compounds further support its role in enhancing skin health and reducing localized inflammation. This review also addresses several challenges in the clinical application of this method, such as standardization, determining optimal therapeutic dosages, and the necessity for more extensive clinical studies for each of its therapeutic uses. Overall, the findings indicate that aromatherapy with *Rosa damascena* essential oil, as a non-invasive and safe intervention, holds significant potential for promoting both mental and physical health. However, its optimal utilization requires further research. The present study seeks to provide a comprehensive and analytical perspective on the therapeutic applications of this method, offering a novel outlook for future investigations.

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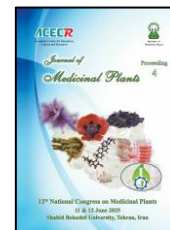
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Poster Presentation ID: 1429

The Prokinetic Effect of Garlic Extract on the Reticulum and Rumen of Sheep

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ARTICLE INFO	ABSTRACT
Keywords: Garlic Sheep Electromyography Reticulum Rumen	Garlic (<i>Allium sativum</i>) has been traditionally used as a folk remedy in Iran to treat gastrointestinal complaints in both humans and animals¹. This study aimed to evaluate the prokinetic effects of hydroalcoholic garlic extract on the contraction and motility of the reticulum and rumen in sheep. Samples of reticulum and rumen tissue were collected from eight sheep and studied <i>in vitro</i>². Garlic extract, at concentrations of 10, 100, and 1000 mg/L, significantly increased rumen smooth muscle contraction, while concentrations of 100 and 1000 mg/L notably enhanced contraction in the reticulum ($P < 0.05$). An <i>in vivo</i> electromyographic study was conducted with six sheep. Following intra-ruminal administration of garlic extract, a significant increase in reticulum and rumen motility was observed compared to the control group (distilled water) on the first, second, and third days post-administration ($P < 0.05$). The most pronounced effect occurred on the second day. These findings suggest that garlic extract has a positive effect on the contraction and motility of the reticulum and rumen in sheep.

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Poster Presentation ID: 1430

Investigation of Phytochemical and Antioxidant Diversity in *Glycyrrhiza glabra* L. Leaves among 21 Populations from Iran

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ARTICLE INFO	ABSTRACT
Keywords: Licorice leaves Phytochemistry Antioxidant activity Total phenols Diversity	<i>Glycyrrhiza glabra</i> L., commonly known as licorice, is a perennial plant belonging to the Fabaceae family, native to Mediterranean regions, southern Russia, and parts of Asia. This plant is renowned for its rich array of bioactive compounds that play vital roles in the pharmaceutical, cosmetic, and food industries. Among these compounds, glycyrrhizic acid is recognized for its anti-inflammatory and immune-enhancing effects, glabridin is noted for its antioxidant properties, and liquiritin demonstrates antimicrobial and therapeutic activities [1]. A significant portion of these compounds is concentrated in the leaves, and their concentrations are influenced by climatic conditions and harvesting times [2]. This study aimed to evaluate 21 wild populations of <i>Glycyrrhiza glabra</i> to identify superior genotypes based on phytochemical traits. A completely randomized design was employed with three replicates, and data were analyzed using SAS software (version 9.3). The analysis of variance revealed that the population from Zanjan sample exhibited the highest flavonoid content, averaging 28.93 mg of quercetin per gram of dry sample. In contrast, the population from Urmia University displayed the lowest flavonoid content, with an average of 19.85 mg of quercetin per gram of dry sample. Furthermore, the populations from Ardabil and Salmas cities recorded the highest and lowest phenolic content, averaging 17.86 mg and 8.87 mg of quercetin per gram of dry sample at a 1% significance level, respectively. Additionally, the antioxidant activity analysis indicated that Marand population had the highest antioxidant activity, with an average of 11.51 mg L⁻¹, while the Nir population showed the lowest, averaging 7.68 mg L⁻¹. These findings underscore the genetic diversity within <i>Glycyrrhiza glabra</i> and highlight its potential for biopharmaceutical applications based on its phytochemical composition.

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Poster Presentation ID: 1431

Determination of Flavonoids Content (Quercetin, Apigenin, Hesperidin) in a Dried Mixed Herbs Consist of Apple Peel, Dried Parsley and Orange Albedo Using Sequential Multi-Solvent Extraction and HPLC Analysis

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ARTICLE INFO	ABSTRACT
Keywords: Quercetin Apigenin Hesperidin Sequential multi-solvent extraction HPLC analysis	Using mixed herbs can enhance the nutritional profile adding vitamins and antioxidants with very few calories for reasons related to preventing disease and promoting health. They are used as medicines for many generations. They have antioxidant, anti-inflammatory, and even anti-cancer properties. This study investigates a natural dried mixed herbs consist of apple peel, dried parsley and orange albedo to support the immune system, focusing on the quantification of three key bioactive flavonoids: quercetin, apigenin, and hesperidin. The extraction of these compounds was performed using a sequential multi-solvent extraction approach, involving solvents of increasing polarity to maximize recovery based on the differential solubility of each flavonoid. The procedure employed ethyl acetate, aqueous ethanol (70%), and methanol: water (50:50) to selectively extract flavonoids from the dried plant-based mixture. The resulting extracts were analyzed using high-performance liquid chromatography (HPLC) equipped with a UV detector and a C18 reversed-phase column. The mobile phase consisted of water/methanol (80:20), with optimized flow rate and temperature conditions for efficient separation. The recovery percent for quercetin, apigenin, and hesperidin were 92%, 94%, and 90%, respectively. This method demonstrated high efficiency in isolating and quantifying bioactive flavonoids from a multi-herbal mix, supporting its potential as a natural immunomodulatory mixture herbs.

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Poster Presentation ID: 1432

Comparison of antibacterial and antioxidant activities of essential oil and Nano-emulsion of *Citrus x aurantium*

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ARTICLE INFO	ABSTRACT
Keywords: <i>Citrus x aurantium</i> Essential oil Nano-emulsion <i>Pseudomonas aeruginosa</i> DPPH⁰	Synthetic preservatives are widely used in the food industry to control spoilage and growth of pathogenic microorganisms, inhibit lipid oxidation processes and extend the shelf life of food. However, synthetic preservatives have some side effects that can lead to poisoning, cancer and other degenerative diseases [1]. In this project, the essential oil of <i>Citrus x aurantium</i> was formulated as a water-dispersible nano-emulsion (diameter = 30 nm) using high pressure ultrasonic method. Analysis of essential oil composition showed that monoterpene hydrocarbons and oxygen monoterpenes comprised the main compounds of essential oil. The antibacterial activity of essential oil and Nano-emulsion oil was evaluated with determination of the minimum inhibitory concentration (MIC) and the minimum biocidal concentration (MBC). In addition, antioxidant activity was measured using DPPH⁰ free radical scavenging method. The results showed that the antibacterial activity of the essential oil increases when it is converted to Nano-emulsion due to easier access of Nano-emulsion to the bacterial cell membrane. In general, gram-positive bacteria displayed more susceptibility to the Nanoemulsion than gram-negative bacteria. <i>Staphylococcus aureus</i> was the most susceptible bacteria to the antibacterial activity of essential oils and Nano-emulsion. In addition, essential oils and Nano-emulsion had significant effects on inhibiting the growth of <i>Pseudomonas aeruginosa</i> and <i>Escherichia coli</i>. The antioxidant activity of Nanoemulsion was higher than in free essential oils using DPPH⁰ methods. The results of this study showed that by converting essential oil to the Nano-emulsion of <i>Citrus x aurantium</i> essential oil, its antibacterial and antioxidant properties can be increased.

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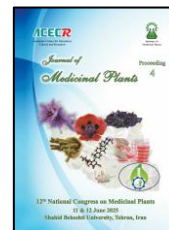
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Poster Presentation ID: 1434

Comparative Micromorphological Analysis of Trichome Types and Densities in Eight Iranian Populations of *Urtica dioica* L. Under Uniform Cultivation

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ARTICLE INFO

Keywords:

Glandular trichomes
Micromorphology
Trichome diversity
Urtica dioica L.
Diversity

ABSTRACT

Trichomes (microscopic epidermal outgrowths) form a fascinating and multifunctional world in plant biology, playing essential roles in defense, secretion of bioactive compounds, and environmental adaptation [1]. *Urtica dioica* L. (common nettle), known for its medicinal and defensive properties, exhibits a high diversity of trichome types. Previous studies have shown that the glandular trichomes of this species are reservoirs of compounds such as histamine, formic acid, acetylcholine, and serotonin, which can trigger pain, inflammation, and hypersensitivity reactions upon contact. In addition, these trichomes are rich in phenolic, flavonoid, and terpenoid compounds, giving them antioxidant, anti-inflammatory, antibacterial, and insect-repelling properties [2]. The non-glandular trichomes, with their needle-like structures, contribute mechanically to herbivore deterrence. In this study, micromorphological diversity of leaf trichomes was investigated in eight Iranian populations of *U. dioica* (UDP1–UDP8) using scanning electron microscopy (SEM). All plants were cultivated under uniform greenhouse conditions to eliminate environmental effects. SEM imaging revealed significant inter-population variation in trichome type, density, and distribution. Both glandular and non-glandular trichomes were observed in all populations, but their structural features and abundance differed notably. Populations such as UDP1 and UDP3 had a high density of capitate glandular trichomes with multicellular heads, suggesting elevated potential for secondary metabolite production. In contrast, UDP5 showed sparse trichome coverage, possibly reflecting adaptation to low-stress habitats. Populations like UDP4 and UDP8 exhibited remarkable diversity in trichome structures, including bifurcated non-glandular and unusually large glandular types—likely due to high genetic variation or environmental plasticity. The structural complexity and distribution patterns of trichomes across populations indicate varying ecological strategies and selective pressures. This diversity may influence phytochemical profiles and stress tolerance, positioning certain populations as superior candidates for medicinal and agricultural applications. Overall, this study highlights the significance of trichome micromorphological variation in *U. dioica* and its relevance as a selection trait in breeding programs.

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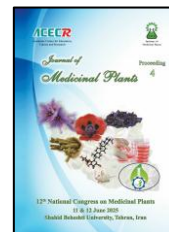
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Poster Presentation ID: 1436

Molecular Docking Analysis of Withaferin A and Withanoid A from *Withania coagulans* (Stocks) Dunal against MCF-7 Cell Line

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ARTICLE INFO	ABSTRACT
Keywords: Anticancer PDB Hydrogen Bond 1E31	“Withanolides are a class of naturally occurring chemical compounds that have been found to possess various medicinal and biological properties. Structurally, they consist of a steroid-backbone bound to a lactone or its derivatives and are produced via oxidation of steroids. Due to their ability to protect plants against herbivores and their medicinal value, withanolides have garnered significant interest from the scientific community. In particular, withaferin A and withanoid A, two important withanolides isolated from <i>Withania somnifera</i> and <i>Withania coagulans</i> , have shown promising potential in treating various diseases including anti-inflammation, anti-cancer, adaptogenic and anti-oxidant effects. To further understand their potential binding affinity with the MCF-7 protein, blind docking calculations were performed using AutoDock Vina and MGL Tools 1.5.4. The 3D structure of MCF-7 was obtained from the Protein Data Bank (PDB ID: 1E31) and prepared using AutoDock Tools-1.5.4, with necessary modifications such as merging non-polar hydrogen atoms and adding Kollman charges. The structures of withaferin A and withanoid A were then obtained from PubChem in 3D SDF format and converted to pdb format using MGL Tools-1.5.4. The docking simulations were carried out in a suitable environment created by a 126×72×56 box with a grid spacing of 1.00 Å and with grid set centers of -6.61, 48.08, and 65.13. The results showed that withaferin A exhibited a higher binding affinity with a docking score of -7.70 kcal/mol, compared to withanoid A with a binding score of -6.90 kcal/mol. These findings suggested strong binding interactions of both compounds with MCF-7, supporting their potential as effective anticancer agents.”

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Poster Presentation ID: 1437

Growth Performance of Thyme (*Thymus vulgaris* L.) under Low Temperature Stress by Vitamin B₁₂ Biofortification

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ARTICLE INFO

Keywords:

Growth
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Freezing stress
ROS detoxification
Stress alleviation
Thyme

ABSTRACT

The exogenous application (biofortification) of vitamins as biostimulants can enhance plant tolerance to various stresses [1]. The influence of vitamin B₁₂ (VB₁₂) in alleviating freezing stress in thyme (*Thymus vulgaris* L.) was investigated as a factorial experiment based on CRD with three replications. Treatments consisted of temperature (25°C and -5°C) and foliar application of VB₁₂ (0 and 100 mg L⁻¹), applied either one or two times. Exposure of thyme plants to -5°C severely damaged root and shoot biomass. One-time biofortification of non-stressed plants improved their height, diameter, herbal fresh, and dry weight but did not mitigate the symptoms caused by the freezing, where both fresh and dry weight reduced to 37.5 g and 8.5 g, respectively. In the absence of VB₁₂, electrolyte leakage increased 10 times more than control, and the influence of VB₁₂ on membrane permeability was minimal. Application of one-time VB₁₂ increased Fv/Fm by 31.36% in stressed plants. Exposure of plants to -5°C decreased the NPQ. Total chlorophyll and carotenoid content and chlorophyll stability index increased under -5°C but reduced when plants recovered. The H₂O₂ activity in plants received one-time VB₁₂ under -5°C stress was 61.16 but lowered to 56.62 % after recovery. The electrolyte leakage and detoxification of accumulated ROS (by lowering H₂O₂) in one-time VB₁₂-treated plants exposed to freezing stress may be considered as a defence strategy of thyme plants to improve its freezing tolerance.

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Essential Oil Content of The Resin of *Pistacia Atlantica* subsp. *kurdica* in The City of Marivan

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ARTICLE INFO	ABSTRACT
Keywords: <i>Pistacia atlantica</i> α-Pinene Resin	The wild pistachio tree (<i>Pistacia atlantica</i>) produces a resin known as sakız, referred to in Kurdish as benesht, jajag, or vanoshk. This resin is light green, thick, and highly adhesive, with a wide range of medicinal uses. It is particularly valued as a potent laxative for treating constipation and various gastrointestinal disorders. Resin samples were collected from <i>Pistacia atlantica</i> trees in the city of Marivan. Essential oils were extracted from the samples using a Clevenger apparatus through water distillation. The chemical composition of the essential oil was analyzed and quantified using Gas Chromatography-Mass Spectrometry (GC-MS). Six major components were identified, making up 100% of the oil's composition: α-Pinene (73.02%), Camphene (2.21%), Sabinene (0.68%), β-Pinene (9.11%), D-Limonene (2.05%), and α-Pinene oxide (0.54%). This analysis underscores the complex chemistry and promising medicinal and industrial potential of <i>Pistacia atlantica</i> resin.

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Comparative Phytochemical Profile and antioxidant activity in the Leaves and Bulbs of Iranian *Leucojum aestivum* L. Populations

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ARTICLE INFO

Keywords:

Alkaloids

Leucojum aestivum

Phytochemical
diversity

Anti-Alzheimer

Gallantamine

ABSTRACT

Leucojum aestivum L., known as the summer snowflake, is a medicinal plant renowned for its bioactive compounds, including alkaloids such as galantamine and lycorine [1, 2], which are associated with neuroprotective and anti-COVID effects, respectively [3]. Despite its potential, the phytochemical variation across different Iranian populations remain underexplored. This study investigated the phytochemical diversity and antioxidant activity in the leaves and bulbs of eight populations of *L. aestivum* collected from various regions of Iran: The total phenolic content (TPC), total flavonoid content (TFC), and antioxidant capacity (FRAP) were measured using spectrophotometric methods, while the galantamine and lycorine levels quantified by HPLC. The results revealed considerable variation in both antioxidant activity and alkaloid content among the populations. Vali Abad (Tonkabon) exhibited the highest TPC in leaves (13.72 mg GAE/g DW) and Valiseh (Rudsar) in bulbs (1.23 mg GAE/g DW). Flavonoid content was also highest in the leaves of Valiseh (Rudsar) (17.24 mg RE/g DW) and Vali Abad (Tonkabon) (18.09 mg RE/g DW). Antioxidant activity, measured by the FRAP method, peaked in the leaves of Vali Abad (Tonkabon) at 90.88 $\mu\text{mol Fe}^{2+}/\text{g DW}$. Significant variations were observed in the plant alkaloid content, with the highest galantamine concentration in the Valiseh (Rudsar) bulbs (33.11 mg/g DW) and the highest lycorine content in the Vali Abad (Tonkabon) leaves (150.53 mg/g DW). The average values of these traits indicated that the populations of Vali Abad (Tonkabon) and Valiseh (Rudsar) generally had the highest values for most traits. Significant positive correlations were found between certain phytochemical traits, such as TPC and TFC in both leaves and bulbs, indicating a strong relationship between these compounds. These findings underscored the considerable phytochemical diversity among Iranian populations, suggesting their potential for therapeutic applications, particularly in antioxidant-rich and alkaloid-based formulations. Further research is required to explore the genetic and environmental factors contributing to these variations.

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Poster Presentation ID: 1441

Phytochemical Composition and Antioxidant Activity of *Solanum nigrum* at Different Fruit Development Stages: Implications for Traditional and Modern Medicine

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ARTICLE INFO	ABSTRACT
Keywords: Black Nightshade Solanaceae Phytochemical Variation DPPH	Medicinal plants and their bioactive compounds play a significant role in disease treatment due to their high efficacy and minimal side effects. <i>Solanum nigrum</i> , commonly known as Tajrizy, is a medicinal herb recognized as a weed that grows wild in various regions of the country. This plant holds a prominent position in traditional Iranian medicine and is utilized for treating infectious diseases, gastrointestinal issues, skin disorders, and related conditions. The fruit of Tajrizy exhibits laxative properties and aids in appetite stimulation [1]. Key bioactive compounds identified in this plant include saponins, glycoalkaloids, polyphenols, and polysaccharides. Notably, the extract from ripe fruits possesses strong antibacterial activity due to these effective compounds. Despite its classification as a weed, the fruit is commonly used raw or cooked in the preparation of soups and salads [2]. This study aimed to evaluate important phytochemical properties, specifically phenolic and flavonoid content, as well as antioxidant activity across three developmental stages of the fruit: immature (green), ripening (yellow), and fully ripe (black). The research employed a completely randomized design with three replicates, and data were analyzed using SAS software (version 9.3). Variance analysis results, significant at the 1% level, revealed that the highest flavonoid concentration was found in immature (green) fruit, averaging 71.384 mg of quercetin per gram of dry sample. Additionally, the fully ripe fruit exhibited the highest phenolic content at the 5% significance level, averaging 71.270 mg of quercetin per gram of dry sample. Findings regarding antioxidant activity at the 5% level indicated that the immature (green) fruit also demonstrated the highest antioxidant activity, with an average of 56.556 mg per liter. In conclusion, the phytochemical profile of <i>Solanum nigrum</i> reveals significant variations in flavonoid and phenolic content, as well as antioxidant activity across different fruit developmental stages, highlighting its potential as a valuable medicinal resource in traditional and modern therapeutics.

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Poster Presentation ID: 1442

Callus Culture Optimization in *Rosa damascene* and Evaluation of Phenolic Composition and Antioxidant Activity

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ARTICLE INFO	ABSTRACT
Keywords: <i>Rosa damascena</i> Callus culture Antioxidants Secondary metabolites Phenolic composition	Damask rose (<i>Rosa damascene</i> Mill) is a valuable medicinal and industrial plant, widely recognized for its rich content of antioxidant metabolites and extensive applications in pharmaceutical, and food industries. Plant tissue culture is a reliable method for sustainable production of these bioactive compounds. The current study aimed to optimize and evaluating methanolic extracts of <i>R. damascene</i> callus culture. Young sterilized explants of <i>R. damascene</i> were cultured on M.S media supplemented with different hormonal combinations including BA, NAA, and 2,4-D. Results indicated that M.S medium containing 2,4-D 2.5 mg/mL combined with BA 1.5 mg/mL significantly improved callus induction rates and secondary metabolite accumulation compared to other tested hormonal combinations. Total phenolic and flavonoid contents significantly increased under optimized conditions. Furthermore, antioxidant assays using DPPH and ABTS methods revealed substantial antioxidant activity in callus extracts. In conclusion, callus culture in the medium supplemented with BA and 2,4-D markedly enhanced bioactive compound production in <i>R. damascene</i> callus extracts. These findings suggest that the callus obtained via optimized culture conditions represents a promising and sustainable source for industrial and pharmaceutical production of antioxidant and known anticancer secondary metabolites.

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Poster Presentation ID: 1444

Ethnobotanical study of plant species in Shulabad district, Lorestan province, Iran

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ARTICLE INFO

Keywords:

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Shulabad

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Plant elements

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ABSTRACT

In the last decade considerable progress has been made in the field of traditional medicine through the implementation by a number of Member States of the WHO traditional medicine strategy 2002–2005, which was noted by the Health Assembly in resolution WHA56.31. Shoulabad is a mountainous region in the province of Lorestan, Aligudarz city, located between the Robat and Bernjeh mountains with a geographical location of N331248, E49554 and an altitude of 1847 meters above sea level. This research aimed to introduce the local medicinal uses of plant species using ethnobotanical methods. Today, traditional medicine and ethnobotanical medicine are two categories of interest in many countries. Approximately one-fourth of the medicines prepared in the world are of plant origin, either directly extracted from plants or synthesized based on plant compounds. The biological forms of the studied area include therophyte 31.85%, geophyte 23.70%, hemicryptophyte 20%, phanerophyte 11.85%, cryptophyte 18.85%, showing the dominant form of plant species. The most common uses of medicinal plants studied among the people of Shulabad region in the field of ethnobotany were observed to be for the treatment of diseases of the digestive system, respiratory system, urinary system, reducing fat and blood pressure, treating and healing wounds, relieving and soothing pain, skin diseases, and treating other diseases. Therefore, it can be concluded that the Shulabad region, with 106 species of medicinal plants, is a rich source of valuable plants, and identifying these plants and the knowledge surrounding them can provide a suitable basis for understanding new therapeutic properties of plants.

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Poster Presentation ID: 1445

A Study on the Phytochemical Properties in *Grimmia ovalis* under Different Temperature Conditions

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ARTICLE INFO	ABSTRACT
Keywords: Temperature stress Secondary Metabolites Antioxidant Enzymes <i>Grimmia ovalis</i>	Bryophytes, including mosses, are among the earliest land plants and are known for their resistance to harsh environments through the production of secondary metabolites and antioxidant compounds. These traits not only make them important ecological models but also potential sources for pharmacological applications. In this study, a range of phytochemical properties of <i>Grimmia ovalis</i> was assessed under temperature stress treatments. The moss species was collected from a natural habitat in Asara village located in Alborz mountain range. The plant material undertook three temperature treatments at 4° C, 20° C, and -20° C for 48 and 96 hours. Methanolic extract was used to quantify secondary metabolites content such as total phenol, flavonol, flavonoid and anthocyanin. Also, the activities of key antioxidant enzymes, including superoxide dismutase (SOD), peroxidase (POX) and polyphenol oxidase (PPO) were assessed via spectrophotometry. Results showed significant elevation in secondary metabolites content and antioxidant enzymes activities in response to the applied temperature treatments, particularly under cold and freezing conditions. The highest activity rate of SOD, POX and PPO enzymes observed in 4° C treatment during 48 hours. Also, the contents of anthocyanin, flavonol and total phenol increased as the temperature decreased. The flavonoid content didn't have any significant changes. Our results indicate that mosses can resist temperature fluctuations by increasing the content of secondary metabolites and antioxidant enzymes activities.

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Poster Presentation ID: 1446

Enhancing Recovery and Stability of Plant-Derived Bioactives via Ultrasonic-Assisted Methods

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ARTICLE INFO	ABSTRACT
Keywords: Bioactive compounds Extraction Ultrasonic-assisted extraction Encapsulation	Plant-derived bioactive compounds possess unique functional properties that make them highly valuable in the development of food, pharmaceutical, cosmetic, and healthcare products. However, their effective utilization has often been hindered by the lack of sustainable and efficient extraction methods. This review aims to explore the potential of ultrasonic-assisted extraction (UAE) as a green, non-thermal technology for the efficient recovery and encapsulation of plant-based bioactive compounds. UAE offers several advantages, including reduced energy consumption, shorter processing times, and enhanced extraction yields (1). Research indicates that ultrasound frequencies above 20 kHz effectively promote the release of bound phenolics, increase the solubility of saponins, alter protein structures and functionalities, and enrich plant extracts (2). Compared to traditional solvent extraction techniques such as Soxhlet extraction, UAE enhances lipid extraction efficiency while reducing processing time, energy usage, and environmental footprint (3). Moreover, ultrasound can be synergistically combined with other techniques to further improve product quality, safety, and sustainability. Beyond extraction, ultrasound also shows great potential in the encapsulation of bioactive compounds, offering protection against adverse environmental conditions during processing and storage. By facilitating the formation of fine emulsions with smaller droplet sizes, ultrasound improves both the stability and encapsulation efficiency of active ingredients.

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Poster Presentation ID: 1447

Influence of Genotype and Season on Polyphenol Composition in Olive Leaves from a Diverse Germplasm Collection

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ARTICLE INFO	ABSTRACT
Keywords: Polyphenolic compounds Seasonal variations Antioxidant activity Olive genotypes Oleuropein	Olive leaves (<i>Olea europaea</i> L.) are well recognized for their richness in phenolic and flavonoid compounds, which contribute to their potent antioxidant and therapeutic properties. The accumulation of these secondary metabolites is influenced by both genetic background and environmental conditions, especially seasonal changes in temperature, light, and stress factors (1). This study investigates the seasonal variation in total phenolic content (TPC) and total flavonoid content (TFC) in the leaves of 23 promising olive genotypes. Leaf samples were collected across four distinct seasons to capture temporal variation. Spectrophotometric assays and HPLC-DAD-MS analysis were employed to identify and quantify phenolic and flavonoid compounds. Initial findings indicate higher TPC levels in winter for several genotypes, which may be linked to enhanced phenolic biosynthesis under cold and light-stress conditions (2). A comparable seasonal pattern was observed in TFC, though the data are still under preliminary validation. These will be further subjected to normalization, statistical evaluation, and biological replicates. Furthermore, HPLC-based profiling of samples with high and low polyphenol levels demonstrated notable differences in both the composition and quantity of polyphenolic compounds between genotype and harvest season. These results highlight the dynamic nature of phenolic accumulation in olive leaves and may guide the selection of genotype and optimal harvest time for maximizing functional bioactives in food and pharmaceutical applications (3).

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Poster Presentation ID: 1448

Evaluation of Analgesic and Anti-inflammatory effects of Methanolic Extract of *Cydonia oblonga* Leaves

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ARTICLE INFO

Keywords:

Cydonia oblonga

Inflammation

Formalin test

Tail flick test

Xylene test

ABSTRACT

Many therapeutic agents are currently used in clinical practice to treat inflammatory and painful conditions with various side effects. The aim of this study was to evaluate the analgesic and anti-inflammatory effects of methanolic extract of *Cydonia oblonga* leaves [1, 2]. In this study, 102 male Wistar rats were used. Formalin and tail flick tests were used to evaluate the analgesic effects of extract (80, 160 and 320 mg/kg). Xylene test was used to evaluate the anti-inflammatory effects (80, 160 and 320 mg/kg). Data were statistically analyzed by ANOVA and Tukey's tests. Administration of methanolic extract of *Cydonia oblonga* leaves in formalin, tail flick and xylene tests significantly affects pain and inflammation responses. Our results indicate that intraperitoneal administration of extract reduces pain in formalin test in doses of 160 and 320 mg/kg and Tail flick test in doses of 80, 160 and 320 mg/kg. Also, administration of the extract reduces inflammation in Xylene test in doses of 160 and 320 mg/kg. The results indicate that the extract significantly reduces both acute and chronic pain induced by the formalin test. The results from the tail flick test also show that the extract increases the latency time before tail withdrawal. Additionally, the study demonstrates that both dexamethasone and the plant extract exhibit anti-inflammatory effects against xylene-induced ear edema. Based on these findings, the extract has a significant impact on both the early and late phases of formalin-induced pain and thermal pain induced by radiation, and it also possesses anti-inflammatory properties in animal models.

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Poster Presentation ID: 1449

A Modified Method for Evaluating Cytotoxic and Antimicrobial Activity of Curcumin and Its Derivatives Using the Brine Shrimp Lethality Assay"

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ARTICLE INFO

Keywords:

Curcumin
Cytotoxicity
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Antimicrobial
Modified method

ABSTRACT

Curcumin, the main bioactive compound of *Curcuma longa* L., has attracted considerable interest due to its wide range of pharmacological effects, including anti-inflammatory, antioxidant, and cytotoxic activities. One of the most problem of measuring antimicrobial, cytotoxic and anticancer activity of curcumin and some of its derivatives, is low solubility in water-based solutions. In this study, we introduce a modified method to solve the mentioned problem. The modified method is based on general methods of brine shrimp lethality and disc diffusion assays for cytotoxicity and antimicrobial activity respectively. These new cost-effective and rapid bioassays provides a valuable procedure for curcumin and some types of its derivatives with low solubility in water. Similar procedure can also be used for other natural or synthetic samples with non-polar molecular structure.

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Poster Presentation ID: 1450

Insight into the Bioactive Potential of Olive Leaves: Screening Polyphenol-Rich Genotypes and Enrichment with Macroporous Resin

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ARTICLE INFO	ABSTRACT
Keywords: Olive leaf Polyphenols Biological effects Different genotypes Macroporous resin	Olive (<i>Olea europaea</i> L.) leaves are a promising reservoir of secondary metabolites—particularly polyphenols and flavonoids—well-known for their antioxidant and therapeutic properties (1). The quantity and quality of these bioactive compounds are influenced by both genetic background and environmental conditions (2). This study is the first to investigate the phytochemical composition, total polyphenol and flavonoid content, and antioxidant activity of hydroalcoholic leaf extracts from 23 promising olive genotypes, collected from two distinct locations, with the aim of identifying high-polyphenol candidates for enrichment using macroporous resin technology. Preliminary data revealed considerable inter-genotypic variation, with TPC ranged from 22.9 to 53.3 mg/g, and TFC ranged from 0.6 to 13.9 mg/g. Genotypes such as Dakal, Dakal Roodbar, and the in vitro propagated genotype showed superior polyphenol accumulation. These phytochemical trends were supported by initial DPPH assays, indicating stronger radical scavenging activity in extracts with higher phenolic content. Following extract selection, macroporous resin was applied for fractionation and enrichment. Optimization steps included selecting appropriate resin type, sample loading concentration, adsorption/desorption times, and solvent conditions. These conditions were successfully fine-tuned, resulting in a reproducible protocol for efficient polyphenol recovery, consistent with previous reports on macroporous resin efficiency (3). Our findings reveal substantial chemical diversity among olive genotypes and support their potential as natural sources of antioxidant agents for future pharmaceutical or nutraceutical applications.

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Poster Presentation ID: 1451

Phytochemical Profiling of *Sargassum oligocystum* Montagne Using Gas Chromatography-Mass Spectrometry from Chabahar Bay

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ARTICLE INFO

Keywords:

Sargassum oligocystum

Brown macroalgae

Bioactive compounds

Biological activities

ABSTRACT

Sargassum C. Agardh, a genus of brown macroalgae prevalent in diverse marine ecosystems, is recognized as a promising source of bioactive compounds derived from its unique photosynthetic and metabolic properties. This study investigates the volatile and semi-volatile organic constituents in *Sargassum oligocystum* extracts collected from Chabahar Bay. The extracts were prepared using the Rodriguez-Ruiz method and analyzed using Gas Chromatography-Mass Spectrometry (GC-MS). The GC-MS analysis revealed a rich array of organic compounds within the *Sargassum oligocystum* extracts, including significant amounts of fatty acids, sterols (notably fucosterol), terpenoids, phenolic compounds, and various hydrocarbons. A considerable amount of the identified compounds are fatty acids, such as 17-Octadecynoic acid, and their methyl or ethyl esters, such as Methyl myristate, Methyl palmitate, Methyl arachidonate, Methyl linolelaidate, and Oleic acid methyl ester. The presence of Neophytadiene and Isofucosterol indicates the occurrence of terpenoids, another major class of plant secondary metabolites. Neophytadiene is a common marine algal component, while Isofucosterol is a sterol that is an important constituent of cell membranes and may have biological roles. The identification of 2,4-di-tert-butyl-phenol suggests the presence of phenol, known for its antioxidants and other biological activities. This indicates that *Sargassum oligocystum* is a rich source of phytochemicals, typical of marine algae known to produce a variety of secondary metabolites.

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Poster Presentation ID: 1455

Efficacy of Vital Power[®], a biostimulant fertilizer, on collard greens (*Brassica oleracea* var. *viridis*)

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ARTICLE INFO	ABSTRACT
Keywords: Organic fertilizer Amino acids Kale Yield <i>Brassica</i>	Collard greens (<i>Brassica oleracea</i> var. <i>viridis</i>), a nutrient-dense leafy vegetable of the Brassicaceae family, possess significant medicinal properties due to their high concentration of bioactive compounds, including glucosinolates, phenolic acids, and ascorbigen, which exhibit antioxidant, anti-inflammatory, and chemopreventive activities [1,2]. To enhance crop yield, this study evaluated the effects of a single foliar application of Vital Power[®] (at 2L/1000L) on collard greens under controlled greenhouse conditions. This organic fertilizer contained free L-amino acids (12%), total nitrogen (N, 6%), phosphorus (P₂O₅, 6%), and water-soluble boron (B, 0.6%). Ten days after the applied treatment, growth parameters including leaf number, plant height (cm), leaf length (cm), leaf width (cm), shoot fresh weight (g), shoot dry weight (g), root fresh weight (g), and root dry weight (g) were measured. Ten replicates were considered for each parameter. The treated plants showed significantly greater values than controls across all measured parameters (t-test, $P < 0.05$): leaf number (12.80 ± 0.25 vs. 7.90 ± 0.31), plant height (35.40 ± 0.82 vs. 24.50 ± 1.21 cm), leaf length (13.00 ± 0.26 vs. 8.80 ± 0.29 cm), leaf width (9.50 ± 0.45 vs. 6.50 ± 0.40 cm), shoot fresh weight (70.63 ± 0.79 vs. 25.52 ± 0.51 g), shoot dry weight (6.42 ± 0.07 vs. 3.24 ± 0.06 g), root fresh weight (3.01 ± 0.17 vs. 1.58 ± 0.09 g), and root dry weight (0.63 ± 0.04 vs. 0.41 ± 0.02 g). The results indicate that foliar application of Vital Power[®] significantly improves key growth parameters in collard greens, demonstrating its efficacy as a biostimulant for enhancing production of this medicinally valuable crop.

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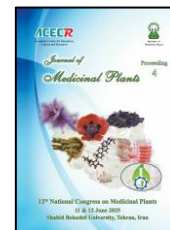
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Poster Presentation ID: 1456

Comparative Analysis of Phenolic Profiles and Antioxidant Activities of Species (*Taraxacum officinale*, *Cynara scolymus*, *Silybum marianum*) Using HPLC and HPTLC

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ARTICLE INFO	ABSTRACT
Keywords: Phenolic Profiles Antioxidant activity Asteraceae HPLC HPTLC	The Asteraceae family encompasses several medicinal herbs with a high potential for hepatoprotective and antioxidant applications. This study aimed to evaluate and compare the phenolic content and antioxidant capacity of three major species from this family <i>Taraxacum officinale</i>, <i>Cynara scolymus</i>, and <i>Silybum marianum</i>. Each species was morphologically authenticated and chemically profiled through a combination of UV-Vis spectrophotometry, High-Performance Liquid Chromatography (HPLC), and High-Performance Thin-Layer Chromatography (HPTLC) [1]. Total phenolic content was highest in <i>Cynara scolymus</i> (17.8 mg GAE/g DW), followed by <i>Taraxacum officinale</i> (15.4 mg GAE/g DW), and <i>Silybum marianum</i> (0.43 mg GAE/g DW). HPTLC chromatograms confirmed the presence of rutin, gallic acid, and chlorogenic acid in <i>C. scolymus</i>; silybin A/B and silychristin in <i>S. marianum</i>; and chlorogenic and caffeic acids in <i>T. officinale</i>. HPLC confirmed these results with precise quantification of each compound based on retention times and standard curves [2]. DPPH assay revealed significant differences in antioxidant activity with <i>T. officinale</i> showing an IC₅₀ of 759.9 µg/mL, <i>C. scolymus</i> at 296.9 µg/mL, and <i>S. marianum</i> at 2922 µg/mL, reflecting species-specific antioxidant potential. Furthermore, all samples complied with international safety limits for pesticide and heavy metal residues based on GC-MS and AAS evaluations [3]. This comparative analysis underscores the variation in antioxidant performance and phenolic richness among Asteraceae herbs, justifying their differential inclusion in standardized polyherbal formulations for liver support and oxidative stress modulation.

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Poster Presentation ID: 1457

The production of *Passiflora incarnata* L. in response to the application of biological and growth stimulants in the greenhouse environment

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ARTICLE INFO	ABSTRACT
Keywords: Bio-fertilizers Passionflower Growth Indices Trichoderma Azotobacter	To mitigate the negative impacts of chemical fertilizers on soil and plant health, bio-fertilizers offer a promising alternative. This study investigated the effects of the fungus <i>Trichoderma harzianum</i> and the bacterium <i>Azotobacter chroococcum</i> on the growth and yield of passionflower (<i>Passiflora incarnata</i> L.), a medicinal plant. A controlled greenhouse experiment was conducted using a randomized design, comparing four treatments: a control group (no inoculation), inoculation with <i>Trichoderma</i>, inoculation with <i>Azotobacter</i>, and a combined inoculation of both. Some growth and physiological characteristics of the passionflower plants including plant height, root length, leaf number, stem and root fresh and dry weights, and leaf chlorophyll content were evaluated. The results demonstrated that bio-fertilizer application significantly improved several growth indices. The combined treatment of <i>Trichoderma</i> and <i>Azotobacter</i> consistently outperformed the other treatments across all measured traits. <i>Azotobacter</i> alone also showed significant improvement compared to <i>Trichoderma</i> in several key growth parameters. Specifically, the combined treatment resulted in significant increases in plant height, root length, leaf number, stem and root biomass, and leaf chlorophyll content. While <i>Azotobacter</i> alone also enhanced these characteristics, <i>Trichoderma</i> alone did not differ significantly from the control group. This highlights the synergistic effect of combining the two bio-fertilizers. The findings suggest that <i>Trichoderma</i> and <i>Azotobacter</i>, when used together, can substantially enhance passionflower growth and yield. Further research is warranted to optimize application methods and explore the full potential of these bio-fertilizers. Developing an optimized protocol could lead to a more sustainable and effective approach to passionflower cultivation, reducing reliance on chemical fertilizers and promoting healthier plants and soil. The study underscores the potential of bio-fertilizers in improving plant productivity and promoting sustainable agricultural practices.

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Poster Presentation ID: 1458

Effects of hydroalcoholic extracts of *Mentha longifolia* L., *Mentha piperata* L., *Satureja hortensis* L. and their compounds against *Gardnerella vaginalis* in in vitro

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ARTICLE INFO	ABSTRACT
Keywords: Medicinal plants Hydroalcoholic extract <i>Gardnerella vaginalis</i> Disk diffusion MIC	Bacterial vaginosis is a type of change in the normal vaginal bacterial flora that leads to the loss of hydrogen peroxide-producing lactobacilli and bacterial overgrowth. This type of vaginitis is the most common genital tract infection, with anaerobic bacteria, especially <i>Gardnerella vaginalis</i>, being 100 to 1000 times more abundant than in healthy individuals. Metronidazole is used as the drug of choice in the treatment of <i>Gardnerella</i> infection. However, potential carcinogenicity, teratogenic effects on the fetus, and resistance of this organism to metronidazole have been reported. Considering the cytotoxic effects of medicinal plants on microbial organisms and in order to determine the effect of the three mentioned plants, in this study, an effective medicinal combination was introduced using the above plants. This study was conducted to investigate the anti-<i>Gardnerella</i> properties of hydroalcoholic extracts of oregano, mint, savory and binary and triple mixtures of these plants. In this study, two methods were used: antibiogram and MIC. The results of this study showed that the triple mixture of oregano, mint, and savory extracts at a concentration of 100 mg/ml with a halo diameter of 71.4 mm had the largest diameter of the growth inhibition zone, and the hydroalcoholic extract of mint at a concentration of 12.5 mg/ml with a halo diameter of 20.3 mm had the smallest diameter of the growth inhibition zone of <i>Gardnerella vaginalis</i> bacteria. Also, the triple mixture of oregano, mint, and savory showed relatively better results than the antibiotic metronidazole. The results of the minimum inhibitory concentration showed that the lowest inhibitory concentration was related to the antibiotic metronidazole and the triple mixture of hydroalcoholic extracts of oregano, mint, and savory, and the lowest was related to the hydroalcoholic extract of the medicinal plant mint. This study showed that hydroalcoholic extracts of savory, mint, oregano, and binary and triple mixtures of these extracts have antibacterial effects against <i>Gardnerella vaginalis</i>, which in this respect has shown greater antibacterial power compared to similar works by other researchers.

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Poster Presentation ID: 1459

GC/MS Evaluation of the Essential oil of *Ecballium elaterium* L. from Azarbaijan region

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ARTICLE INFO	ABSTRACT
Keywords: Squirting Cucumber Essential oil Ecotypes Terpenoid Azarbaijan	<i>Ecballium elaterium</i> L. species is one of the valuable species in Iranian folk medicine (1), which have pharmacological properties (2). Phenols are widespread secondary metabolites in plants that have been identified as essential compounds in the defense of plants to pathogens (3). This paper aims to investigate the phytochemical features of <i>Ecballium elaterium</i> L. in some habitats of Azarbaijan region. For this purpose, was designed to evaluate chemical composition the effect of habitat on some ecotypes of Squirting Cucumber. an experiment was conducted on 24 ecotypes related to three habitats of this plant in the region of Azerbaijan. Gas chromatography-mass spectrometry analysis of the extracted essential oils was performed to study of chemical composition of arial parts, and rhizomes of the <i>Ecballium elaterium</i> L. of collecting genotypes. Qualitative analysis of the obtained essential oils showed that 18, 19, and 19 compounds were identified in the essential oil of the rhizomes of this plant in the three habitats of Kalibar, Moran, and Moghan, respectively, and 20, 18, and 20 compounds were identified in the essential oil of the aerial parts of this plant in the three habitats mentioned, respectively. The most frequent compounds in all three regions were Non-terpenoid (4.9-44.5%); Terpenoid (27.4-88.2%); and Fatty acids (2.7-26.1%). This plant has great potential for possible applications in the functional foods, medical, and pharmaceutical.

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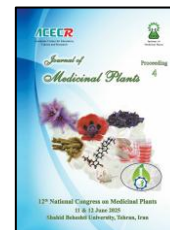
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Poster Presentation ID: 1460

Survey of Morphological and Biochemical Effects of Water Mint (*Mentha aquatica* L.) in Amol City, Mazandaran Province

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ARTICLE INFO

Keywords:

Winter Mint
Mentha aquatica L.
Aquatic Plants
Medicinal Plants
Essential Oil

ABSTRACT

Mentha aquatica L. as an aromatic perennial and medicinal plant belongs to the Lamiaceae. It is a source of essential oils. The studied plant, as a native plant, plays a major role in various uses of the local people. This research was conducted to investigate the morphological and biochemical characteristics of the plant. Amol city is located between the Caspian Sea and the Alborz Mountains. In the spring of 1404, water mint was collected from the banks of rivers and gardens and the authenticity of the plant was confirmed by local people. The quantitative and qualitative characteristics of the plant were obtained from various sources and its uses were obtained by local residents. In this research, information such as botanical characteristics, essential oil, phenolic compounds, and various uses were obtained. A review of various sources and Frequent discussions revealed the following. morphological characteristics: Water mint grows in moist areas along rivers, marshes and springs. Its stems are square, green or purple, hairy to almost hairless. Rhizomes are scattered with fibrous roots. The leaves are opposite, toothed, oval to ovate, green and sometimes purple, hairy to almost hairless and the flowers are also very small, crowded, almost spherical inflorescences. The color is pink to purple. Phenolic compounds: The plant extract has antimicrobial activities, which can be attributed to the high content of phenolic compounds, especially phenolic acids. The phenolic acids present in the methanol extract are gallic acid, chlorogenic acid, caffeic acid, and the most abundant phenolic acid in its leaves is chlorogenic acid. The constituents of the extract include phenolic compounds such as apigenin, pyrilin, salvigenin, and gardenin B, which confirm the antioxidant properties of this extract. Essential oils: The most important compounds of essential oil include eucalyptol, menthofuran, trans-caryophyllene, germacrene-D, veridiflorol, and beta-myrcene. usage: The leaves of this plant are an edible vegetable and a food flavoring agent. Its infusion is very useful for respiratory diseases such as asthma, bronchitis, colds, allergies, itching, and abdominal pain. It is also known as an antimicrobial and insecticide. Winter mint is a native plant with numerous uses and is a favorite of the people of the region, and has the potential for broader research [1,2].

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Poster Presentation ID: 1462

The effect of chitosan on the essential oil content and percentage of monoterpenes and sesquiterpenes in *Satureja rechingeri* under drought stress

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ARTICLE INFO

Keywords:

Satureja rechingeri

Drought Stress

Chitosan

Monoterpene

Sesquiterpene

ABSTRACT

Water deficit in plants may disrupt physiological processes and in medicinal plants may lead to changes in yield and essential oil composition. Chitosan is a natural biocompatible polymer that acts as a stimulant in agriculture and reduces the adverse effects of abiotic stresses. Therefore, considering the medicinal importance of *Satureja rechingeri*, the aim of the present study was to investigate the effect of chitosan on the essential oil content and percentage of monoterpenes and sesquiterpenes in *Satureja rechingeri* under drought stress. This study was conducted as a factorial experiment based on a completely randomized design in the greenhouse of Lorestan University. The factors included drought stress at three levels of non-stress (90-100%FC), moderate stress (70-80%FC), severe stress (50-60%FC) and foliar application of chitosan at three levels (0, 80 and 160 mg/L). The results showed that the interaction effect of drought stress and chitosan on the evaluated traits was significant ($p < 0.01$). The essential oil content increased under moderate stress, with the highest essential oil content (1.96%) being obtained under moderate stress without foliar application. However, The essential oil content decreased under severe stress. 80 mg/L chitosan increased essential oil content by 26% under severe stress. Severe drought stress decreased the percentage of monoterpenes and increased the percentage of sesquiterpenes in the essential oil. 160 mg/L chitosan increased the percentage of sesquiterpenes by 52% under severe stress. The highest percentage of sesquiterpenes (5.33%) was obtained with the foliar application of 160 mg/L chitosan under severe stress. In addition, both concentrations of chitosan decreased the percentage of monoterpenes and increased the percentage of sesquiterpenes under moderate stress significantly. The highest percentage of monoterpenes (96.83%) was obtained with the foliar application of 80 mg/L chitosan under non-stress conditions.

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Poster Presentation ID: 1463

Habitat Assessment and Ecological Profile of the Vulnerable Species *Cynomorium songaricum* Rupr. in the Gol Gohar Region

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ARTICLE INFO	ABSTRACT
Keywords: <i>Cynomorium songaricum</i> Medicinal plant Habitat assessment Soil Properties	<i>Cynomorium songaricum</i> Rupr. a rare and medicinally valuable species of the family Cynomoriaceae, has been largely overlooked in ecological studies within Iran. Belonging to the genus <i>Cynomorium</i>, which includes only two species (<i>C. songaricum</i> and <i>C. coccineum</i>), it is primarily distributed across arid and semi-arid regions of the Northern Hemisphere [1]. <i>C. songaricum</i> is known for its succulent stem, which is harvested and dried for medicinal purposes. It is currently listed as Vulnerable (VU) by the IUCN, and is classified as a second-level protected species under the CITES convention [2]. In this study, the habitat of the rare medicinal plant <i>C. songaricum</i> Rupr. was investigated in southern Sirjan, in the Gol-e Gohar region, and the margins of the Sirjan Palya. To this end, climatic conditions, geology, soil characteristics, and associated plant species were assessed. The habitat is characterized by a cold-arid climate with an average annual precipitation of 120 mm. It is located within the Sanandaj–Sirjan geological zone, on recent Quaternary deposits, at elevations ranging from 1710 to 1725 meters above sea level. The associated flora mainly consists of herbaceous and shrubby species like <i>Seidlitzia florida</i> (M. B.) Bunge ex Boiss, <i>Salsola arbuscula</i> Pall, and <i>Halochneum strobilaceum</i> (Pall.) M. B (2), while tree and tree-shrub species are rarely present. Soil salinity, measured from the surface down to a depth of 90 cm, averages 21.7 dS/m. The soil has a light texture and is classified as calcareous. Moreover, it is poor in essential nutrients such as nitrogen and phosphorus. The results indicate that the population density of <i>C. songaricum</i> is very low, with an average of 2.3 individuals per hectare. Additionally, the species <i>Salsola dendroides</i> Pall. serves as the host for this parasitic species.

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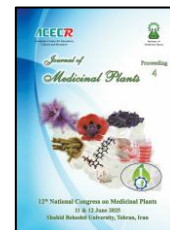
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Poster Presentation ID: 1464

Evaluation of the phytochemical diversity of *Rosa damascene* EO in Hamadan

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ARTICLE INFO	ABSTRACT
Keywords: Damask rose Genotype Diversity Phytochemical compounds	Damask rose (<i>Rosa damascena</i> Mill.), belonging to the Rosaceae family, has been significantly valued in horticulture, food industries, biochemistry, pharmaceuticals, and particularly for the essential oil and bioactive compounds present in its flowers, from ancient times to the present day. In the present study, cuttings of this plant were collected from four damask rose producing villages: Dareh Morad Beyk, Silvar, Divin, and Abbas Abad. After rooting, the cuttings were transferred to the research farm of the Ekbatan Research Station in March 2005 and planted in a randomized complete block design with three replications. In the third year after planting, the essential oil of the genotypes was extracted by hydrodistillation. The separation and identification of the essential oil components of these genotypes were performed using GC/MS. The data were analyzed and grouped using PAST software. Based on the results, 14 phytochemical compounds were identified. Two principal components explained 94% of the variation among these cultivars. Citronellol in the first component with a high and positive factor loading (85.3%) and n-nonadecane, n-nonadecane and cis-rose oxide with positive factor loadings (8.7%) accounted for the genotypic variations. Furthermore, the results of principal component analysis confirmed the grouping obtained from cluster analysis. In such a way that the three groups obtained from cluster analysis were distinguishable in the principal component analysis. Climatic conditions (temperature, humidity, and precipitation), soil composition and nutrition, agronomic management, and genetic diversity, can be the diversity of phytochemical compounds in the genotypes.

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Poster Presentation ID: 1465

Evaluation of Farmyard Manure Effects on Morphological Traits of Different Basil (*Ocimum basilicum*) Genotypes under Greenhouse Conditions

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ARTICLE INFO	ABSTRACT
Keywords: Basil Genotype Morphological Greenhouse	This study was conducted to evaluate the effects of farmyard manure on the morphological and biochemical traits of six basil (<i>Ocimum basilicum</i>) genotypes under greenhouse conditions. The experiment was arranged as a factorial based on a completely randomized design with three replications. The first factor comprised six genotypes, and the second factor included three planting media: control (pure soil), a 50:50 soil-to-manure ratio, and a 30:70 soil-to-manure ratio. The results showed significant effects of both genotype and treatment on most morphological traits. The highest leaf dry weight (0.519 g) and stem diameter (33.13 mm) were observed in the Shiraz genotype under the 50:50 treatment. Similarly, the highest total plant dry weight (1.24 g) and internode length (5 cm) were recorded in the Kermanshah genotype under the same treatment. No significant interaction effect was found for leaf fresh weight and total plant fresh weight, but the main effect of the 50:50 treatment was significant for both traits. The highest chlorophyll content was recorded in the Karaj genotype under the 50:50 soil-to-manure ratio. Additionally, the highest total phenolic content was observed in the Isfahan genotype under the same treatment. Overall, the findings suggest that applying a 50:50 soil-to-manure mixture can enhance basil growth under greenhouse conditions, with genotype selection playing a crucial role in optimizing performance.

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Poster Presentation ID: 1467

Ethnopharmacological Study of *Phoenix dactylifera* L. in Saravan, Suran, and Sarbaz

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ARTICLE INFO

Keywords:

Ethnopharmacology
Indigenous knowledge
Traditional medicine
Cultural preservation
Phoenix L.

ABSTRACT

This ethnopharmacological study investigates the traditional medicinal uses of *Phoenix dactylifera* L., commonly known as date palms, in Saravan, Suran, and Sarbaz. By documenting these uses through interviews with the indigenous people, the study aims to validate and integrate ethnopharmacological knowledge into modern healthcare frameworks, fostering sustainable use of *P. dactylifera* and respect for cultural heritage. Semi-structured interviews and participatory observations with local healers and community members revealed the local names of *P. dactylifera* varieties (more than 30) and their diverse therapeutic applications across these regions. Key medicinal uses include treating female infertility with male date flowers preparations to enhance reproductive health and applying leaf-derived pastes for wound dressing due to their soothing properties. Date extracts serve as antiseptics to prevent infections, while tonics boost physical strength, particularly in labor-intensive communities. Dates are also valued for their anti-constipative effects, attributed to high fiber content, and are used to promote digestive health. Additional applications include remedies for fatigue and immune support, underscoring the plant's integral role in traditional medicine. This study highlights the richness of indigenous pharmacopeia and the need to protect it. Future research will explore phytochemical analyses to substantiate the pharmacological basis of these traditional remedies, ensuring ethical collaboration with indigenous communities to support both scientific validation and cultural continuity.

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Poster Presentation ID: 1468

A Genipin-Crosslinked Alginate–Chitosan Foam Scaffold for the Management of Exudative Wounds

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ARTICLE INFO

Keywords:

Chronic wounds
Alginate
Genipin
Plant-based scaffold

ABSTRACT

Exudative wounds, such as chronic ulcers, burns, and infected lesions, are characterized by excessive fluid production, which can delay tissue regeneration, promote microbial proliferation, and compromise the wound environment if not properly managed [1]. To address these challenges, wound dressings must possess several critical properties: high fluid absorption to manage exudate, intrinsic antibacterial activity to prevent infection, adequate mechanical strength to maintain structural integrity under moist conditions, biocompatibility to support tissue regeneration, and resistance to enzymatic degradation for prolonged performance. In response, a plant-based foam scaffold was developed using alginate, chitosan, and genipin. Alginate, an anionic polysaccharide obtained from brown algae, was included for its excellent swelling behavior and ionically crosslinked gel-forming ability. Chitosan, a cationic biopolymer derived from chitin, was selected for its known hemostatic, antimicrobial, and tissue-compatible characteristics. To improve the scaffold's stability and functional performance, genipin, a natural crosslinker derived from *Gardenia jasminoides*, was employed to form covalent bonds with the primary amine groups of chitosan. This crosslinking resulted in enhanced mechanical strength, lower solubility, and increased enzymatic resistance [2]. Furthermore, genipin imparted anti-inflammatory and antioxidant properties [3]. Together, these components created a multifunctional, biocompatible scaffold tailored for the treatment of exudative wounds. The composite was fabricated into a porous foam via freeze-drying, resulting in a sponge-like architecture tailored for high exudate uptake. FTIR spectroscopy confirmed successful crosslinking, and scanning electron microscopy (SEM) revealed a well-connected porous network. Compression testing showed significantly improved structural integrity in the genipin-crosslinked foam compared to non-crosslinked controls. Swelling studies confirmed rapid fluid uptake and retention without disintegration, while enzymatic degradation assays demonstrated sustained matrix stability. Cytocompatibility tests using fibroblasts indicated favorable cell adhesion and proliferation. Moreover, antimicrobial assays showed inhibition of *Staphylococcus aureus* and *Escherichia coli* growth. This genipin-crosslinked alginate chitosan foam scaffold offers a safe, biocompatible, and functional platform for advanced management of exudative wounds.

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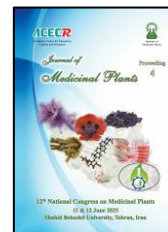
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Poster Presentation ID: 1469

Optimization of the Parameters for Preserving *Rosa damascena* Flowers in Water Before Extracting the Essential Oil

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ARTICLE INFO

Keywords:

Rosa damascena
Essential oil
Preservation
Optimization
DOE

Having many uses in perfume, cosmetic and pharmaceutical industries, the essential oil, extracted from the flowers of *Rosa damascena* Mill. is the most valuable product of aromatic plants. So, extending the safe storage period of the flowers without changing the quality and quantity of the essential oil is a crucial step in maintaining the economic viability of it. In this study, different parameters of preserving the flowers in water, before extracting is optimized using Doehlert Design method. Four parameters of temperature, storage duration, extraction duration and ratio of flowers to water were considered. Citronellol to geraniol ratio (C/G) was selected as a criterion of essential oil quality. Results show that preserving of *Rosa damascena* flowers without losing essential oil and undesirable changing in the quality is possible for more than 10 days. In this way, the essential oil extraction yield was 0.02 after preserving at -5 °C which was as much as the yield of oil extraction from fresh flowers. The value of C/G was 1.5 compared to 1.4 for fresh sample.

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Poster Presentation ID: 1470

Antimicrobial effect of polar, semi-polar and non-polar fractions of *Tanacetum parthenium* extract on *Staphylococcus aureus* bacteria, *Listeria monocytogenes*, *Escherichia coli*, *Streptococcus mutans*, *Pseudomonas aeruginosa*.

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ARTICLE INFO

Keywords:

Medicinal plants
Antibacterial
Escherichia coli
Tanacetum parthenium

ABSTRACT

Infection is known as the growth and development of germs or parasites in the body. The infection agent can be a variety of parasites, bacteria, viruses and fungi. Antibiotics should be used to eliminate the infection. When we develop a bacterial infection, few of us consider the use of medicinal herbs. But given their impact on the treatment of a wide range of infections, it may be better to use the plants that are medicinal in nature. The name *Verboscum* is the name of a genus of glimmonium darkness. The use of this plant has traditionally been used in traditional medicine for the treatment of colds, angina and bronchitis, and relief of neurological states, anxiety, heart rate disorders and stomach upsets, as well as joint pain and wound healing and burn. The aim of this study was to investigate the microbial properties of *Tanacetum parthenium* herb against *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Listeria monocytogenes*, *Streptococcus mutans*. The results of this study showed that the ethanolic extract of *Rhuschus* plant has a high inhibitory effect on all five bacteria and the chloroform extract of *Listeria monocytogenes* and *Streptococcus mutans* has a high inhibitory effect on other bacteria and has little inhibitory effect. Also, hexane extract of *Rhuschus* plant did not have any effect on none of the bacteria studied. In general, it can be concluded that *Tanacetum parthenium* extract has an antibacterial effect on bacterial strains of *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Listeria monocytogenes* and *Streptococcus mutans*.

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Poster Presentation ID: 1471

Effects of Foliar Application of Iron Sulfate, Methanol, and Citric Acid on Morphophysiological and Phytochemical Characteristics of Saffron (*Crocus sativus* L.)

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ARTICLE INFO	ABSTRACT
Keywords: Ferrous sulfate Methanol Citric acid Crocin Picrocrocin Safranal	Saffron (<i>Crocus sativus</i> L.), belonging to the Iridaceae family, is one of the most valuable medicinal and aromatic crops globally. Excessive use of chemical inputs and synthetic growth regulators in recent decades has raised environmental and health concerns. As a sustainable alternative, this study evaluated the effects of foliar application of iron sulfate (0, 1, and 2 g L⁻¹), methanol (0, 5, and 10 % v/v), and citric acid (0 and 8 mM) on the morphophysiological and phytochemical traits of saffron in a factorial experiment based on a randomized complete block design (RCBD) with 18 treatments and 3 replications during two consecutive growing seasons (2023–2024). The results revealed significant interactions among all three treatments on major growth traits, including number of leaves, flowers, corm diameter and length, number of daughter corms, and fresh/dry stigma weight. Particularly, iron sulfate at 1 g L⁻¹ significantly increased leaf and flower number, enhancing photosynthetic surface and subsequent flower production. The combination of 5 % methanol with iron sulfate and 8 mM citric acid significantly improved traits such as corm diameter and picrocrocin content—an important compound responsible for saffron's taste. Furthermore, the highest dry stigma yield was obtained from the triple interaction of 2 g L⁻¹ iron sulfate, 5 % methanol, and 8 mM citric acid. These findings demonstrate that tailored foliar application of these compounds can substantially enhance the quantity and quality of saffron yield, offering a practical strategy for sustainable saffron cultivation.

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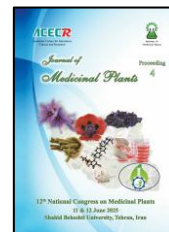
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Poster Presentation ID: 1472

Effect of Manure Levels on Essential Oil Content in Basil Genotypes

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ARTICLE INFO	ABSTRACT
Keywords: Basil Essential oil Manure levels Medicinal plant	Basil (<i>Ocimum basilicum</i> L.) is an important medicinal and aromatic plant widely used in pharmaceutical, food, and cosmetic industries due to its valuable essential oil content. This study aimed to investigate the effects of different manure levels on the essential oil percentage of six basil genotypes under greenhouse conditions. The experimental treatments included three soil-manure ratios: control (soil without manure), 50% soil + 50% manure, and 70% manure + 30% soil. The genotypes used in this study originated from different regions of Iran, including Kermanshah, Shiraz, Isfahan, and three others. After full plant growth, leaf samples were collected, and essential oil was extracted using the hydro-distillation method. Analysis of variance showed a significant interaction between genotype and manure level on essential oil content ($P < 0.05$). The highest essential oil percentage was obtained from the Kermanshah genotype under the 50:50 treatment, followed by the Shiraz genotype under the same condition. Conversely, the Isfahan genotype under the 70:30 treatment showed the lowest essential oil content. These findings suggest that basil genotypes respond differently to manure application levels, and that optimal organic fertilization, alongside proper genotype selection, can significantly enhance both the quantity and quality of essential oil production. Therefore, integrating genotype-specific nutrition management could be a key strategy in the cultivation of high-value medicinal plants.

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Poster Presentation ID: 1473

Biochemical Compounds of the Medicinal Plant *Dracocephalum kotschyi* Boiss. in Kermanshah

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ARTICLE INFO

Keywords:

Total soluble sugar content
Total phenolic content
Total flavonoid content

ABSTRACT

The Lamiaceae family is one of the largest and most diverse plant families, comprising over 3,200 species and 282 genera. Among these, the *Dracocephalum* genus includes eight annual or perennial herbaceous species in Iran, known for their medicinal and aromatic properties. One of the most prominent and endemic species of this genus in Iran is *Dracocephalum kotschyi* Boiss., locally referred to as "Zarrin-Giah" or "Dena Lemon Balm," which holds significant medicinal and economic value. To investigate some of the biochemical characteristics of this valuable species, an experiment was conducted in 2025 in a completely randomized design with three replications at the Plant Physiology Laboratory of the Faculty of Agriculture and Natural Resources, Razi University. The measured traits included total soluble sugars, total phenolic content, and total flavonoid content in the aerial parts of the plant. The results revealed that *Dracocephalum kotschyi* contains substantial amounts of secondary metabolites with medicinal value. The average total soluble sugar content was measured at 111.82 mg/L, total phenolic content at 0.597 mg/L, and total flavonoid content at 1.085 µg/L. These findings highlight the species' high potential for antioxidant production and its prospective applications in medicine.

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Poster Presentation ID: 1475

Selection of Superior Celery (*Apium graveolens*) Populations Using Chromatographic Methods

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ARTICLE INFO	ABSTRACT
Keywords: Chromatography Celery Diversity Phytochemical Domestication	Celery (<i>Apium graveolens</i>) is a multifunctional medicinal plant widely utilized as a food ingredient—both raw and cooked—as well as a key component in pharmaceutical and fragrance industries. Its notable antioxidant properties arise from secondary metabolites, including essential oils and phenolic compounds. This study employed various chromatographic techniques to identify and quantify the secondary metabolites of 12 celery populations collected from different regions of Iran (Urmia, Hamedan, Kermanshah, Ahvaz, Karaj, Isfahan, Sanandaj, Mashhad, Gilan Gharb, Zanjan, Ardabil, Qom). The applied methods included Thin Layer Chromatography (TLC), Gas Chromatography (GC), and High-Performance Liquid Chromatography (HPLC). TLC, as the simplest and most cost-effective method, successfully identified five furanocoumarin compounds in the methanolic extract of aerial parts of celery. Furthermore, GC/MS analysis revealed 34 essential oil components from seeds and 29 from aerial parts, including monoterpenes, sesquiterpenes, oxygenated sesquiterpenes, and related compounds. HPLC identified 14 compounds, comprising flavonoids, phenolic acids, and furanocoumarins. The Ardabil and Kermanshah populations exhibited distinct chemotypic profiles with higher antioxidant potential due to variations in key compounds within their essential oils and extracts, making them superior selections. The choice of chromatographic techniques for compound isolation and identification depends on the compounds' volatility and the available analytical resources. Assessing the phytochemical and morphological diversity of this medicinal plant facilitates the selection of elite populations for domestication and crop improvement.

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Poster Presentation ID: 1476

Modeling and Optimization of Steam Distillation Extraction of Rosemary Essential Oil Using Response Surface Methodology (RSM)

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ARTICLE INFO	ABSTRACT
Keywords: Steam Distillation Extraction Rosemary Essential Oil Response Surface Methodology	Nowadays it is essential to explore and develop new methods for extracting essential oils from herbal plants [1]. The aim of this research is to investigate a steam distillation's performance in essential oil extraction in comparison to ordinary distillation systems. Thirteen experiments with three power levels (300, 600, and 900 watts) and three extraction durations (30, 60, and 90 minutes) were considered to measure the yield of extraction process of essential oil. The yield of extracted essential oil was modeled and optimized using the response surface methodology (RSM) with central composite design (CCD). Also, the type and amount of extracted essential oil compounds in each experimental extraction were determined using gas chromatography coupled to mass spectrometry (GC-MS) and gas chromatography (GC). The yield and quality of the extracted essential oil by Clevenger was also considered as a control experiment. The results showed that the quadratic model is able to predict the essential oil yield with acceptable precision ($R^2 = 0.9590$). Also, the optimization results showed that the power of 866 watts and the time of 78 minutes were obtained as the optimal working conditions of the essential oil extraction system. Based on these operating conditions, the extracted essential oil yield reached 0.37% (v/w). Furthermore, chemical analysis of essential oils showed that operating condition affects the the number and percentage of dominant compounds of extracted essential oils which approved by previous research [2]. At the 900 W extracting condition process, the dominant essential oil compounds were caryophyllene and borneol, while in the 300 and 600 W and Clevenger experiments, the dominant essential oil compounds were alpha-pinene, camphene, and camphor.

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The effect of different dormancy-breaking treatments on the germination of the medicinal plant Zarrin Giaah (*Dracocephalum kotschy* Boiss).

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ARTICLE INFO

Keywords:

Gibberellic acid
6-Benzylaminopurine (BAP)
Sulfuric acid
Murashige and Skoog
medium

ABSTRACT

Zarrin-Giaah (*Melissa officinalis* subsp. *altissima*), commonly known as Dena lemon balm, is a valuable medicinal plant species that exhibits complex seed dormancy. As a result, conventional cultivation methods face significant limitations, and the plant's growth under normal conditions is notably slow. Moreover, both plant height and leaf size are substantially reduced in such conditions. In addition, tissue culture propagation and the use of explants such as hypocotyls are practically unfeasible for this species. To overcome these challenges, a study was conducted in 2025 at the Plant Tissue Culture Laboratory of the Faculty of Agriculture, Razi University, to investigate and compare various methods for breaking seed dormancy in Zarrin-Giaah. The tested methods included:

1. Cold treatment (freezing) for 24 and 48 hours,
2. Physical scarification using sandpaper,
3. Chemical scarification using concentrated sulfuric acid for 10 minutes,
4. A combination of physical and chemical scarification,
5. Treatment with BAP hormone at concentrations of 0.5, 1, and 2 mg/L,
6. Treatment with GA₃ hormone at concentrations above 15 mg/L,
7. Simultaneous application of BAP and GA₃ hormones,
8. A combined application of all the aforementioned treatments,
9. Seed culture on MS medium under induced darkness for 72 hours.

The results indicated that among the methods tested, chemical scarification with concentrated sulfuric acid prior to sterilization was the most effective in breaking seed dormancy and improving germination rates in Zarrin-Giaah.

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Calcium Channel Inhibition as a Mechanism Underlying the Spasmolytic Effects of Eugenol on Isolated Bovine Abomasal Smooth Muscle

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ARTICLE INFO	ABSTRACT
Keywords: Eugenol Bovine Abomasum Calcium Channel Spasmolytic	Eugenol, the principal bioactive component of clove oil, has attracted considerable attention in both traditional medicine and veterinary science due to its antispasmodic, anti-inflammatory, and antimicrobial properties^{1,2}. This study aimed to evaluate the effects of eugenol on the contractility of bovine abomasum smooth muscle and to elucidate its potential mechanism of action. Abomasal tissues were collected from a slaughterhouse, thoroughly washed, and prepared into uniform strips. The tissue samples were immersed in an organ bath containing Krebs solution maintained at 37°C and continuously aerated with a mixture of oxygen and carbon dioxide. Muscle contractions were monitored using a transducer connected to a PowerLab data acquisition system. Dose-response curves were generated using spasmogens such as acetylcholine, KCl, BaCl₂, and carbachol, followed by the application of increasing concentrations of eugenol³. The results demonstrated that eugenol significantly inhibited both spontaneous and spasmogen-induced contractions in a dose-dependent manner. Further studies revealed that the antispasmodic mechanism of eugenol operates through calcium channel inhibition, a mechanism closely analogous to that of verapamil. These findings suggest that eugenol may serve as a promising plant-derived therapeutic agent for the management of gastrointestinal motility disorders in ruminants.

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Poster Presentation ID: 1480

Assessment of Genetic Diversity in Selected Olive (*Olea europaea* L.) Genotypes Using ISSR Markers and Peptide Profiling in Olive Oil

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ARTICLE INFO	ABSTRACT
Keywords: Peptide Profiles Olive Oil Minudasht Olive Collection HPLC ISSR	The bioactive compounds in olive oil, particularly fatty acids, peptides and polyphenols, have demonstrated significant antioxidant, anti-inflammatory, antimicrobial, and disease-preventive properties. Given the growing importance of utilizing elite olive genotypes, evaluating genetic diversity alongside the bioactive profile of olive oil provides valuable insights for breeding programs and medicinal applications. In this study, the genetic diversity of several olive genotypes of Minudasht Olive Collection were analyzed using Inter Simple Sequence Repeat (ISSR) markers. For that, genomic DNA was extracted from leaf samples using a modified Doyle and Doyle method, and PCR amplification was performed using a set of ISSR primers. The resulting banding patterns were analyzed using appropriate statistical software to calculate diversity indices, conduct cluster analysis, and determine genetic relationships among the genotypes. Additionally, the peptide profiles of olive oil from selected genotypes in the Minudasht Olive Collection were evaluated. Peptides were extracted from the oil of promising genotypes using standard protocols, and chromatographic fingerprints were obtained through HPLC analysis. This part of the study aimed to assess diversity in peptide profiles among the genotypes and explore possible associations with their genetic characteristics. Preliminary findings revealed considerable genetic variation among the studied genotypes, which could inform breeding strategies, genetic resource conservation, and the development of olive-based pharmaceutical products. Peptide profiling also showed notable differences among genotypes, supporting further investigation into genotype-phenotype relationships at the molecular level.

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Poster Presentation ID: 1482

Enhancing Morphological and Phytochemical Traits in *Centella asiatica* Using Carbon Quantum Dots: Concentration-Dependent Effects

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ARTICLE INFO

Keywords:

Gotu kola
Carbon Quantum Dots
Nanoparticles
Plant growth
Terpenoids

ABSTRACT

Centella asiatica, a member of the Apiaceae family, is known for its bioactive terpenoids, collectively referred to as centellosides [1]. Carbon quantum dots (CQDs) were synthesized from transgenic *C. asiatica* hairy roots expressing the *squalene synthase* gene. These nanoparticles are gaining attention due to their straightforward synthesis, low toxicity, biocompatibility, and potential to enhance plant growth and metabolism [2]. CQDs were produced using a one-step hydrothermal method from *C. asiatica* hairy roots, followed by cooling, centrifugation, filtration, dialysis, and storage at 4 °C. The Murashige and Skoog (MS) culture medium was supplemented with CQDs at concentrations of 50, 200, 500, 1000, and 2000 mg/L, along with a control group. Each treatment was replicated three times, with three *C. asiatica* plants per vessel, and data were collected after 45 days. Fresh weight ($0.34 \pm X$ g) and dry weight ($0.007 \pm Y$ g) did not show statistically significant differences among treatments. However, seedling length ($2.82 \pm Z$ cm) was significantly increased ($P < 0.01$), indicating a growth-promoting effect. Preliminary observations also suggest that different CQD concentrations had a marked impact on the enhancement of phytochemical metabolite accumulation. Higher concentrations appeared to promote increased production of these compounds, suggesting a concentration-dependent stimulation of the plant's metabolic pathways. These findings suggest that CQDs, particularly at higher concentrations, can be used as effective elicitors in plant tissue culture systems to boost the production of valuable secondary metabolites, offering a promising strategy for pharmaceutical and nutraceutical applications.

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Poster Presentation ID: 1483

Evaluation of Phenolic Content in Different Populations of *Alhagi maurorum*

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ARTICLE INFO

Keywords:

Camel thorn
Medicinal plant
Secondary metabolite

ABSTRACT

Alhagi maurorum is a valuable medicinal plant native to arid and semi-arid regions, renowned for its medicinal properties, rangeland restoration potential, and high tolerance to harsh environmental conditions (Gairola et al., 2023). This species has been traditionally utilized in herbal medicine and is recognized as a rich source of phenolic compounds (Ghorbani, 2005). Secondary metabolites such as phenolic contents are important to cope with different stress. To evaluate the phenolic content of different *A. maurorum* populations, an experiment was conducted in 2024 using a completely randomized design (CRD) with three replications under controlled laboratory conditions at the Seed Technology Laboratory, Faculty of Agriculture, Shahed University. The experimental treatments consisted of seeds collected from seven rangelands in Tehran Province, including Moradabad, Fathabad, Akhtarabad, Chichaklu, Shourabad, Javadabad, and Bibi Sakineh. Analysis of variance revealed that the studied traits were significantly influenced by the different *A. maurorum* populations. Based on the LSD mean comparison results, the Bibi Sakineh population exhibited the highest germination percentage (52%). The highest phenolic content (1.25 mg/g) observed in the Bibi Sakineh population. These findings highlight the considerable genetic diversity among the studied populations, providing a strong basis for selecting superior genotypes for breeding programs, commercial cultivation, and conservation of the genetic resources of this important medicinal species.

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Evaluation of Oil Content and Fatty Acid Profile in some Iranian Local Melon (*Cucumis melo* L.) Cultivars

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ARTICLE INFO

Keywords:

Melon (*Cucumis melo* L.)
Seed oil
USFA/SFA ratio
Linoleic acid
Oil quality

ABSTRACT

This study investigated the seed oil content and fatty acid composition of four traditional Iranian melon (*Cucumis melo* L.) landraces: Tow-Qhermez, Haj-Naderi, Gorgab, and Mashhadi. Analysis of variance revealed significant genetic variation ($P \leq 0.05$) among the cultivars for most fatty acid traits, with particularly high determination coefficients ($R^2 = 0.72\text{--}0.95$) for oil percentage, palmitic acid (C16:0), total saturated fatty acids (SFA), the unsaturated/saturated fatty acid (USFA/SFA) ratio, and linoleic acid (C18:2 n-6), indicating strong genetic control over these parameters. Among the evaluated landraces, Gorgab exhibited the highest oil content (31.30%) and linoleic acid level (61.6%), while Mashhadi had the lowest oil content (23.60%) and the highest proportion of saturated fatty acids (16.8%). The USFA/SFA ratio, an important indicator of oil nutritional quality, was greatest in Tow-Qhermez (5.44) and Gorgab (5.62), suggesting a more favorable lipid profile from a health perspective. These results are consistent with previous findings in Cucurbitaceae species, confirming the presence of considerable genetic diversity in seed oil composition and highlighting the nutritional value of local germplasm. Furthermore, the dominance of linoleic and oleic acids among the unsaturated fatty acids aligns with earlier reports, underscoring their contribution to oxidative stability and potential health benefits. Based on these findings, Gorgab and Tow-Qhermez can be considered promising genetic resources for breeding programs aimed at enhancing seed oil content and nutritional value. This research provides a solid foundation for the valorization of native Iranian melon germplasm and supports its utilization in functional food and nutraceutical industries.

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Enhancing 1,8-Cineole Content in *Nepeta crispa* Essential Oil Through Optimized Cultivation Practices

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ARTICLE INFO	ABSTRACT
Keywords: <i>Nepeta crispa</i> 1,8-cineole Plant density Harvest time Essential oil	The genus <i>Nepeta</i>, belonging to the Lamiaceae family, is recognized for its diverse chemical profiles, with certain species distinguished by the presence of nepetalactone diastereoisomers as primary constituents, while others, like <i>Nepeta crispa</i>, feature 1,8-cineole as the predominant component [1]. 1,8-cineole (Eucalyptol), a naturally occurring monoterpene, has a rich history of traditional medicinal applications and demonstrates a wide range of biological activities, such as anti-inflammatory, antioxidant, antimicrobial, bronchodilatory, and analgesic properties [2]. Optimizing the production of 1,8-cineole from <i>N. crispa</i> requires an understanding of the relationship between planting density (PD) and harvest timing (HT). Plant density, a key agricultural factor, influences plant growth and secondary metabolite accumulation by mediating the balance between primary and secondary metabolism [3]. In order to investigate the effect of PD and HT on 1,8-cineole content of <i>N. crispa</i>, the essential oil of seedlings cultivated at five different plant densities (18, 27, 36, 45 and 54 plants m⁻²) and harvested at two time points (spring and summer) was obtained by hydrodistillation. The obtained oil was then analyzed by GC-FID and GC/MS. Statistical analysis revealed that PD significantly affected 1,8-cineole levels ($p < 0.05$), with the highest concentrations at 27 and 54 plants m⁻² (47.36% and 46.45%, respectively) and the lowest at 45 plants m⁻² (39.87%). HT also had a significant effect ($p < 0.01$), with the second harvest producing a higher average 1,8-cineole content (47.60%) than the first. These findings highlight the importance of species-specific optimization of PD and HT to maximize the production of key essential oil constituents. Proper management can significantly enhance oil quality, thereby improving the commercial value of medicinal and aromatic plants.

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Poster Presentation ID: 1486

Antiviral Activity of nanoemulsions produced from β -Caryophyllene essential oil against Influenza A H1N1

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ARTICLE INFO

Keywords:

Nanoemulsions
Essential oils
Antiviral activity
Influenza A H1N1

ABSTRACT

The escalating threat of drug-resistant influenza A viruses necessitates the development of novel antiviral strategies. Essential oils (EOs), rich in diverse bioactive compounds, hold promise as alternatives, but their inherent limitations in water solubility and volatility restrict their clinical application. This study investigates the potential of nanoemulsions, a promising delivery system, to enhance the antiviral efficacy of EOs against Influenza A H1N1. We formulated various nanoemulsions encapsulating EO Caryophyllene and evaluated their physicochemical properties (size, stability). In vitro antiviral activity against Influenza A H1N1 was assessed by using combination of antiviral tests, including Co-inoculation treatment (Simultaneous treatment assay), pre-inoculation treatment (Pre-penetration assay), post-inoculation treatment (Post-penetration assay) and percentage of protection and Hemagglutination assays. Additionally, cytotoxicity assays were conducted to ensure biocompatibility. The synthesized nanoemulsions displayed favorable characteristics, including small droplet size (80-200 nm) and high stability. Remarkably, certain EO nanoemulsions, particularly those containing beta-caryophyllene essential oil and Span 80, showed potent antiviral activity, achieving significant reductions in viral titer by up to 80%. Our findings demonstrate the promising potential of nanoemulsions encapsulating specific EOs as antiviral agents against influenza A H1N1. These findings pave the way for further in vivo investigations and formulation optimization to advance their potential clinical translation.

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***Astragalus ecbatanus* Extract: A Promising Hepatoprotective Agent Against Oxidative Stress in Acetaminophen-Induced Liver Toxicity**

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ARTICLE INFO

Keywords:

Astragalus ecbatanus

Hepatoprotective

Antioxidant

Oxidative stress

Extract

ABSTRACT

Overuse of acetaminophen (AST) can cause nausea, jaundice, liver damage, and acute liver failure. This study aimed to evaluate if *Astragalus ecbatanus* chloroform extract protects against AST-induced liver injury in male Wistar rats [1, 2]. In this experimental study, 60 Wistar rats, weighing about 180-220 grams, were randomly used in 6 groups for *in vivo* investigation. Liver damage and induction of oxidative stress were caused by administration of 300 mg/kg/day of acetaminophen. Different doses of *A. ecbatanus* (10, 25, and 50 mg/kg) were administered to sick mice by daily gavage in three experimental groups (n = 10). Acute liver damage was induced in the rats over a period of 8 weeks with the help of twice AST injection weakly with a dose of 300 mg/kg. At the end of the intervention period, liver damage caused by acetaminophen was investigated by examining serum biochemical factors (ALT, AST, ALP and Bilirubin). In addition, the level of lipid peroxidation (LPO), superoxide dismutase enzyme activity, catalase enzyme activity and glutathione peroxidase activity in liver tissue were evaluated. Data were statistically analyzed by one-way ANOVA followed by Tukey's multiple comparison test. The administering of AST was found to have significantly increased the serum levels of liver injury markers (ALT, AST, ALP, bilirubin, total protein) as well as MDA levels and reduced the activity of SOD, CAT and GPX which are indicators of oxidative stress. Conversely, AST administration showed a *p*-value of less than 0.01, showing that at a dose of 25 mg/kg and 50 mg/kg there was a significant decrease in the serum levels of both oxidative stress and liver damaging markers. Antioxidant therapies were also significantly improved with extract, and MDA levels were significantly reduced while SOD, CT and GPX levels were higher. This research shows that the chloroform extract of *A. ecbatanus* protects adversely against AST caused liver damage.

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The effect of different levels of sunflower oil on the performance and biochemical parameters of broiler chickens

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ARTICLE INFO

Keywords:

Sunflower Oil
Broiler Chicken
Growth Performance
Internal Organs
Biochemical
Parameters

ABSTRACT

Chicken, as one of the most important sources of protein in human nutrition, holds a special place in the livestock and poultry industry. One of the crucial components in poultry nutrition is fat sources, which, in addition to providing energy, can also affect growth performance and the metabolic status of the bird. Sunflower oil, as a rich source of unsaturated fatty acids and antioxidant compounds, has garnered attention in poultry diets. This study aimed to investigate the effect of different levels of sunflower oil on growth performance, the weight of internal organs, and some serum biochemical parameters in broiler chickens. In this research, 200 one-day-old Ross 308 broiler chicks were randomly assigned to four experimental groups, each receiving a diet containing 0 (control), 2, 4, and 6 percent sunflower oil. The experiment lasted for 42 days, and at the end, performance indicators (body weight gain, feed intake, feed conversion ratio), relative weights of internal organs (liver, heart, gizzard, and intestine), and serum biochemical parameters including total protein, albumin, LDL cholesterol, and HDL cholesterol were assessed. The obtained data were analyzed using SPSS statistical software and ANOVA at a significance level of 95% ($P < 0.05$). The results showed that the addition of 4 percent sunflower oil significantly improved ($P < 0.05$) weight gain and feed conversion ratio, while the 6 percent level was associated with reduced feed efficiency. Furthermore, higher levels of oil increased the relative weight of the liver but had no effect on heart weight. In addition, sunflower oil improved serum lipid profiles, including reduced cholesterol and LDL and increased HDL. The findings of this study indicate that the use of sunflower oil at a level of 4% in broiler chicken diets can serve as an effective strategy to improve growth performance.

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Poster Presentation ID: 1491

Enhanced Biomass and Centellosides Production of *Centella asiatica* Hairy Roots in a Custom Air-Lift Bioreactor System

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ARTICLE INFO

Keywords:

Centella asiatica
Bioreactor technology
Triterpenoid
Centellosides
Hairy root culture

ABSTRACT

Centella asiatica, a medicinal plant from the Apiaceae family, contains bioactive compounds such as asiaticoside, madecassoside, asiatic acid, and madecassic acid in both its aerial parts and roots [1]. Hairy root culture offers advantages such as rapid growth, genetic stability, and hormone-free maintenance, making it a reliable source of bioactive compounds for pharmaceutical and cosmetic industries [2]. For large-scale production, bioreactor technology is essential, and selecting an appropriate system is critical to optimizing yield and ensuring economic feasibility [3]. In this study, a custom-designed cylindrical glass bioreactor equipped with an air pump (220–240 V, 5 W, 8 L/min) and porous tubular air stones for uniform aeration—without mechanical stirring—was employed. The bioreactor lid included outlets for pressure control, oxygen regulation, and hose connection. Four grams of *C. asiatica* hairy roots were placed on mesh supports in MS medium. Optimal root growth was observed at the maximum airflow rate of the pump. After four weeks, the growth index of hairy roots in 50 mL flasks ranged from 2.8 ± 0.43 to 3.7 ± 0.31 g, while in the 2 L bioreactor it ranged from 4.00 ± 0.40 to 158.32 ± 12.66 g. To account for initial biomass differences, growth index and net productivity were calculated. The growth index was 0.32 in flasks and 38.58 in the bioreactor, with corresponding net productivities of 18 g/L and 77.16 g/L, respectively—demonstrating a significant increase in biomass yield using the bioreactor. Post-harvest analysis showed a medium pH of 3.89 and electrical conductivity (EC) of 3.37 dS/m. Carbohydrate content was 245.94 mg/g DW in root hairs and 192.34 mg/g DW in the MS medium. HPLC analysis revealed madecassoside and asiaticoside concentrations of 1.51 and 0.172 mg/g DW in roots, and 3.227 and 2.884 mg/g DW in the medium, respectively. This study demonstrates that a simple, cost-effective bioreactor system can significantly enhance *C. asiatica* hairy root biomass and metabolite yield, supporting its use in scalable bioactive compound production.

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Poster Presentation ID: 1492

Investigation of the antioxidant activity of essential oil extracted from the *Ferula Gummosa* Boiss in food industry

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ARTICLE INFO	ABSTRACT
Keywords: Antioxidant Activity Barijeh Essential Oil SD Extraction	Essential oils and aromatic compounds of plant can be used as natural antioxidants in food and biological products due to their anti-radical activity [1]. This study evaluates the antioxidant activity of the essential oil of Barijeh (<i>Ferula gummosa</i> Boiss) and identifies its anti-radical components and finally investigates its application in frying oil as a natural antioxidant compounds. The composition of essential oil extracted through steam distillation (SD) process were identified by gas chromatography coupled to a mass spectrometer and the total phenol content of the essential oil was calculated using the Folin-Ciocalteu method [2]. The antioxidant activity of the essential oil in frying oil was determined by measuring peroxide and thiobarbituric acid values in room temperature (20°C) for seven days and compared with TBHQ (T-butylhydroquinone). The results showed that the main compounds in the essential oil of Barijeh were β-pinene (43.9%) and α-pinene (10.05%), which is in agreement to previous research [3]. In the DPPH (2,2-diphenyl-1-picrylhydrazyl) test, the EC₅₀ value of Barijeh essential oil was 0.094 mg/ml and the amount of phenolic compounds was measured as 7.59 mg/g of dry matter. Based on the results obtained from the ABTS test, the highest anti-radical activity was associated with a concentration of 1 mg/ml of Barijeh essential oil (65.19% inhibition). Also, in the oven test (150°C), Barijeh essential oil at concentrations of 500 and 1000 ppm showed higher antioxidant activity than 200 ppm of TBHQ. These findings suggest that Barijeh essential oil has potential as a natural antioxidant for use in the food industry, particularly in edible oil.

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Poster Presentation ID: 1493

Optimization of Yield and Phenolic Metabolites in *Dracocephalum kotschy* Boiss via Intercropping and Nitrogen Fertilization

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ARTICLE INFO	ABSTRACT
Keywords: Medicinal plants Additive intercropping Phytochemicals Land equivalent ratio Economic viability	Medicinal plants are crucial for self-sufficiency, employment, and economic development regionally and globally. This study, conducted in 2018 at Bu-Ali Sina University using a randomized complete block design with three replications, evaluated the effects of additive intercropping and nitrogen fertilization on <i>Dracocephalum kotschy</i> Boiss yield and phytochemical properties. Treatments included additive intercropping of 20% and 40% green bean with <i>D. kotschy</i>, nitrogen at 40, 80, and 120 kg/ha, and a control (sole cropping, no fertilizer). Results showed that the highest plant height, leaf yield, and total yield, without significant differences from 120 kg/ha nitrogen, were obtained with additive intercropping of 20% green bean with <i>D. kotschy</i>. The control recorded the lowest plant height, leaf yield, and total yield, with reductions of 50%, 66%, and 67%, respectively. HPLC analysis indicated that chlorogenic acid yield was highest in additive intercropping of 20% green bean with <i>D. kotschy</i>, while salviolanic acid and quercetin yields were greatest with 120 kg/ha nitrogen. The land equivalent ratio peaked in additive intercropping of 20% green bean with <i>D. kotschy</i>. Compared to 80 kg/ha, 120 kg/ha nitrogen enhanced phytochemical content (particularly quercetin) and yield (non-significantly), but higher costs suggest 80 kg/ha as more economically viable unless phytochemical enhancement is prioritized. This study is the first to examine additive intercropping and nitrogen application effects on phenolic metabolites in <i>D. kotschy</i>, underscoring the significant impact of these practices on yield optimization.

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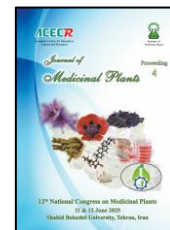
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Poster Presentation ID: 1497

The Effect of Irrigation Levels and Planting Date on Some Morphological Characteristics and Yield of Coriander (*Coriandrum sativum* L.)

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ARTICLE INFO

Keywords:

Coriander

Grain yield

Harvest index

ABSTRACT

Coriander (*Coriandrum sativum* L.) is a medicinal, aromatic plant of the Apiaceae family. Available water is one of the climatic factors that affects the distribution of plants around the world. Planting date by adapting the growth stages of the plant with soil and air temperature, day length and other environmental factors affect crop growth and yield. Considering that Iran is located in arid and semi-arid regions and the production of vegetable seeds is of great economic importance. The experiment was conducted in Hamedan in 2024 as a split plot based on a randomized complete block design with three replications. Irrigation levels (100, 75, 50 and 25% evaporation from Class A evaporation pan) and planting dates (April 3, April 18 and May 3) were as the main plots and sub plots, respectively. The results showed that reducing the amount of irrigation water to 50% of evaporation from the pan did not have any significant effect on the most studied traits, but in the treatment of 25% of evaporation from the pan, number of lateral branches (15.4%), biomass yield (41.9%), grain yield (53.8%) and harvest index (34.1%) decreased compared to control. Planting dates in April 3 and 18 were not significantly different in terms of the most studied traits, but delay in planting to May 3, reduced plant height (10.3%), number of lateral branches (25.6%) and grain (31.8%) and biomass yield (29.3%), but increased flowering branches (31.1%) and total vegetative biomass (18.6%). The interaction of irrigation levels and planting dates on dry weight of seed branches were significant. On the other hand, considering save water in Hamedan, aimed to maximum vegetative biomass production, irrigation levels of 50% evaporation from the pan and planting on May 3 is recommended. Also planting on April 18 is recommended to achieve maximum coriander grain yield.

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Poster Presentation ID: 1498

Effect of Farmyard Manure and Plant Density on Some Morphological Properties and Yield of Parsley Varieties (*Petroselinum crispum* L.)

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ARTICLE INFO	ABSTRACT
Keywords: Parsley Organic fertilizer Leaf fresh weight	Parsley (<i>Petroselinum crispum</i> L.) which today is classified as a vegetable, has many properties and is used in food and pharmaceutical industries. An experiment was conducted using a split-split plot layout based on a randomized complete block design with three replications in Hamedan. The main plot consisted of three harvests (first, second and third), while subplots included farmyard manure treatments (0 and 5 t/ha). Sub-subplots were randomized as factorial combinations of three plant densities (20, 30, and 40 plants/m²) and two parsley varieties (<i>crispum</i> and <i>neapolitanum</i>). The effect of plant density was significant for several parameters: the number of branches per plant, fresh yield of leaves and total fresh and dry weight of the parsley plants. The effect of harvest timing was significant on number of branches per plant, fresh yield of leaves, and total dry weight. Also applying 5 t/ha of manure had higher yield than the control. The interaction between plant densities and cow manure levels significantly affected plant height. Also plant height, fresh yield of leaves, total dry weight of parsley were significantly influenced by the interaction between varieties and harvest timing. The results of this research revealed that across three harvests, the application of decomposed cow manure, in conjunction with plant density and variety selection, significantly influenced the characteristics of the parsley plants. The highest yield was observed during the initial harvest, while the optimal total fresh weight and fresh leaf weight were recorded during the third harvest. Among the three plant densities tested, the most favorable yields were achieved at densities of 30 plants/m², with the highest leaf fresh weight and total fresh and dry weight observed at a density of 40 plants/m². Also comparing the two varieties, the <i>crispum</i> variety demonstrated the highest yield.

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Poster Presentation ID: 1499

GABA's Influence on Growth and Stomatal Conductance in *Datura innoxia* Under Drought Conditions

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ARTICLE INFO	ABSTRACT
Keywords: 4-Aminobutyric acid <i>Datura</i> Drought stress Full irrigation Stomatal conductance	In recent years, the application of amino acids either through foliar spraying or soil addition has attracted significant attention as a method to enhance plant growth and productivity under various environmental conditions. GABA (4-Aminobutyric acid or γ-aminobutyric acid), a non-protein four-carbon amino acid, is found in both eukaryotes and prokaryotes and serves as an important component of amino acid sources. This study was conducted to investigate the effects of GABA on growth traits and stomatal conductance of <i>Datura innoxia</i> plants under drought stress conditions, using a factorial design arranged in a complete randomized block design in the research farm of University of Mohaghegh Ardabili. Treatments included GABA at three concentrations (0, 1, and 2 mg/L) and drought stress (full irrigation and irrigation cutoff at the flowering stage). The results showed that drought stress caused a reduction in fresh weight and stomatal conductance of <i>Datura innoxia</i> plants. The use of various GABA concentrations increased fresh weight and stomatal conductance under normal irrigation conditions and prevented declines in these traits under water deficit conditions. Furthermore, the highest leaf area (78.08 cm²) was observed in plants treated with 1 mg/L GABA, while the maximum thousand seed weight (7.97 g) was seen in plants treated with 2 mg/L GABA under full irrigation. These values were respectively 40.87 and 13.5% higher than those in plants where irrigation was cut off.

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Poster Presentation ID: 1500

Enhancing Plant Resilience to Water Stress with Lactic Acid Bacteria Biofertilizer: A Study on *Datura innoxia*

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ARTICLE INFO

Keywords:

Chlorophyll

Datura innoxia

Lactic Acid Bacteria

Leaf area

Irrigation

ABSTRACT

Biofertilizers are diverse microbial populations that biologically convert unavailable nutrients into forms accessible to plants. Lactic Acid Bacteria (LAB) are among the most important plant microbiomes, derived from the decomposition of plant materials, vegetables, fruits, dairy products, fermented foods, fermented beverages, silos, fruit juices, and the gastrointestinal tracts of humans and animals. This study was conducted to investigate the effects of LAB on the traits of thousand seed weight and leaf color changes in the *Datura innoxia* plant under water stress conditions, in a factorial experiment arranged in a completely randomized block design in the research farm of University of Mohaghegh Ardabili. Treatments included LAB at three concentrations (0, 5, and 10%) and irrigation stress (full irrigation and irrigation cutoff at the flowering stage). The results showed that irrigation cutoff caused a reduction in thousand seed weight and leaf area in *Datura innoxia* plants. The use of different LAB concentrations increased thousand seed weight and leaf surface area under normal irrigation conditions and prevented declines in these traits under water stress. Additionally, the highest levels of chlorophyll and carotenoids were observed in plants treated with 10% LAB under full irrigation. This study indicates that water stress negatively impacts plant growth traits, but the application of LAB biofertilizer, especially at 10% concentration, can have positive effects in maintaining these traits under water stress conditions. Therefore, using LAB can be an effective strategy to mitigate the negative effects of environmental stresses on plants.

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Poster Presentation ID: 1501

Antibacterial effects of Garlic extract (*Allium sativum* L.) on Methicillin-resistant *Staphylococcus aureus* Isolates

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ARTICLE INFO	ABSTRACT
Keywords: Garlic extract MRSA MIC Antimicrobial effects	In the last decade, antibiotic resistance has led to the increased use of medicinal plants with less side effects instead of common drugs. Garlic (<i>Allium Sativum</i>) is regarded as a potential therapeutic, curative and medicinal plant. It is widely used all over the world due to its great antibacterial properties. The present study was done to investigate antibacterial effects of garlic extract against methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) strains isolated from clinical samples. In this study, 8 isolates of <i>S. aureus</i> were identified by bacteriological tests and their antibiotic resistant pattern were determined by disk diffusion antibiogram test. MRSA isolates belonged to 75.0% of isolates. The standard tube test was used to determine the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of garlic extract. As well, the diffusion method was used to compare its antibacterial effect with different commercial antibiotics. The MIC and MBC were 1.25 mg/ml and 3.10 mg/ml, respectively. Results showed that garlic extract has inhibitory effect on MRSA strains. Considering increasing prevalence of MRSA strains and the beneficial effect of garlic on these strains, this extract can be recommended for the treatment of <i>S.aureus</i> infections, especially MRSA.

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Poster Presentation ID: 1502

Effect of Drought Stress and Sodium Nitroprusside on Some Biochemical Properties of Sage (*Salvia officinalis* L.)

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ARTICLE INFO	ABSTRACT
Keywords: Sage Nitric oxide Essential oil Antioxidant activity	In order to study the effect of drought stress as well as foliar application of sodium nitroprusside (nitric oxide) on some biochemical characteristics in sage (<i>Salvia officinalis</i> L.), an experiment was conducted in a greenhouse and has been carried out as factorial based on a completely randomized design with three replications in 2023. Experimental factors included different drought levels 100, 75, 50 and 25% FC and foliar application of sodium nitroprusside at three concentration levels 0(control), 100 and 200 μM. Plants were sprayed with sodium nitroprusside in 6 to 8 leaf stage, after 24 hours, drought treatment was applied. The second stage of treatments was done one week after first stage and after two weeks, chlorophyll a, b and total chlorophyll, electrolyte leakage, prolin, the activity of superoxide dismutase and catalase enzymes, essential oil and total phenol content were measured. The results showed that increasing drought stress significantly decreased the Chlorophyll a, b and total concentration and increased the activity of antioxidant enzymes, phenol, proline, electrolyte leakage and essential oil. Sodium nitroprusside had significant effects on the chlorophyll a and total concentration that this effects was maximum in 200 μM. Also based on the results of the interaction effect of drought stress with foliar application of sodium nitroprusside significantly increased activity of antioxidant enzymes by reducing drought-induced oxidative stress. The highest percentage of essential oil (0.98%) was obtained in foliar application with 200 μM sodium nitroprusside and 25% FC. Finally sodium nitroprusside treatment protected sage plant from water deficit stress and decreased its damages.

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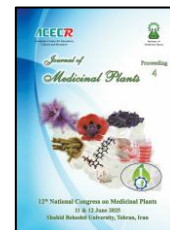
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Poster Presentation ID: 1503

Evaluation of Antimicrobial Activity of the Prepared Nanoemulsions of *Zhumeria majdae* Essential Oil

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ARTICLE INFO

Keywords:

Nanoemulsion

Zhumeria majdae

Antimicrobial agent

Essential oil.

ABSTRACT

Zhumeria Majdae essential oil provides a wide range of biological activities due to its bioactive compounds.¹ This essential oil, like other essential oils, has a low solubility in water and easily evaporates or is destroyed by direct exposure to heat and light.² In the present study, *Zhumeria Majdae* essential oil nanoemulsion was prepared using Tween 80 as a surfactant and Span 80 as an essential oil coating. Infrared spectroscopy and field emission scanning electron microscopy were used to identify *Zhumeria Majdae* essential oil nanoemulsion. According to the FESEM image, the resulting nanoemulsion particles are spherical and have an average size of 65 nm. Also, the antimicrobial activity of *Zhumeria Majdae* essential oil nanoemulsion was evaluated against *Candida albicans* fungus and Gram-positive *Staphylococcus aureus* and Gram-negative *Escherichia coli* bacteria. According to the obtained results, the nanoemulsion of *Zhumeria Majdae* essential oil showed good activity in inhibiting the growth and killing of *C. albicans*, *S. aureus* and *E. coli* bacteria. These findings show the potential applications of nanoemulsions containing *Zhumeria Majdae* essential oil as a natural antimicrobial agent in pharmaceutical and food industries.

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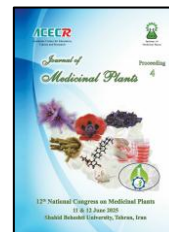
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Poster Presentation ID: 1504

Green Synthesis of Zinc Oxide Nanoparticles using *Satureja mutica* Extract and Evaluation of Their Antibacterial Activity

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ARTICLE INFO

Keywords:

ZnO NPs

Satureja mutica

Antibacterial activity

Extract

ABSTRACT

In recent decades, the desire to produce and use materials with nanometer dimensions is increasing day by day due to the interesting properties of these materials.¹ There are many different methods for the production of metal nanoparticles, but the use of plants in the synthesis of nanoparticles has received much attention due to their low cost and environmental friendliness.² In this study, the biosynthesis of zinc oxide nanoparticles and by the extract of *Satureja mutica* and the investigation of their antibacterial properties are reported. Bioactive compounds, such as phenolic compounds found in the extract and essential oil of *Satureja mutica*, act as a reducing and a capping agent for the bioproduction of nanoparticles. The formation of nanoparticles was confirmed by observing the absorption peak of surface plasmon resonance of zinc oxide nanoparticles in 360 nm in the ultraviolet/visible spectra. The interactions between the bioactive compounds of *Satureja mutica* and the produced ZnO NPs were evident in the FTIR spectra. The prepared nanoparticles were investigated using field emission scanning electron microscopy (FESEM), Dynamic Light Scattering (DLS) and X-ray diffraction (XRD). ZnO NPs were spherical in shape, and their average particle size determined by FESEM was about 45 nm. Furthermore, ZnO NPs exhibited good antibacterial activity against *Bacillus subtilis* and *Staphylococcus aureus* (Gram-positive bacteria), *Escherichia coli*, and *Pseudomonas aeruginosa* (Gram-negative bacteria). MIC values for zinc oxide nanoparticles were between 0.25-0.5 mg/ml. The obtained results show that the wild sage can be a low-cost, non-toxic and environmentally friendly natural source for the synthesis of zinc oxide nanoparticles, which may be useful for the development of new antibacterial agents in medicine.

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Poster Presentation ID: 1505

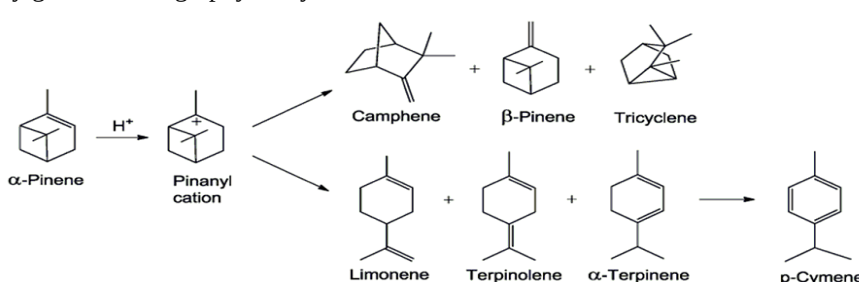
Preparation of Highly Consumed Aromatic Compounds by Isomerization of Turpentine Oil over Nano-Silica Sulfuric Acid Catalyst

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ARTICLE INFO	ABSTRACT
Keywords: Fragrance compounds Heterogeneous catalyst <i>Pistacia atlantica</i> gum Turpentine oil	The use of renewable feedstocks such as monoterpenes to produce small chemical molecules through heterogeneous catalytic processes is considered a sustainable approach in accordance with the principles of green chemistry. Among various terpenes, pinene is a type of reactive substrate that can be converted into various value-added chemicals mainly through catalytic reactions such as isomerization, epoxidation, hydration, esterification and etherification [1]. The isomerization of α-pinene produces the mixture of camphene, α-terpinene, terpinolene, <i>p</i>-cymene and limonene, which are very useful in cosmetics, pharmaceuticals and daily chemicals [2]. <i>Pistacia atlantica</i> gum contains 20-30% turpentine oil and 70% rosin (colophony). More than 90% of turpentine oil is composed of α-pinene. In this project, turpentine oil was first extracted from <i>P. atlantica</i> gum by hydrodistillation and then used as a cheap raw material in the presence of a recyclable heterogeneous catalyst of nano-silica sulfuric acid to prepare some aroma terpenes. The isomerization reaction of α-pinene over nano-silica sulfuric acid catalyst at 90 °C led to the formation of fragrance compounds including camphene (40%), terpinolene (16%), <i>p</i>-cymene (15%), and limonene (9%) as main products (Scheme 1), which were characterized by gas chromatography analysis. 

Scheme 1. Preparation of aroma terpenes by acid-catalyzed isomerization of α -pinene

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Poster Presentation ID: 1508

Effects of Methyl Jasmonate, Salicylic Acid, and GABA on Phenolic Compounds, Antioxidant Activity, and Gene Expression in the Rutin Biosynthesis Pathway of *Calendula officinalis*

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ARTICLE INFO

Keywords:

Calendula officinalis

Methyl jasmonate

DPPH

ABTS

Real-time PCR

ABSTRACT

Calendula officinalis, a medicinal herb, is valued for its rich content of phenolic compounds and strong antioxidant properties. The purpose of this study was to investigate the effect of three elicitors methyl jasmonate (150 μ M), salicylic acid (150 mg/L), and γ -aminobutyric acid (GABA, 0.1 mM) on total phenolics content, with a focus on rutin, as well as antioxidant activity and gene expression related to the rutin biosynthesis pathway in comparison to a control. The experiment was conducted as a factorial based on a completely randomized design with three replications and two sampling times. Total phenolic content and total flavonoids were determined using the Folin–Ciocalteu and aluminum chloride colorimetric methods, respectively. Antioxidant capacity was measured via DPPH and ABTS radical-scavenging assays. In the following, the phenolic profile of each sample was analysed using HPLC technique. Additionally, Real-time PCR was used to analyze the expression of important genes linked to rutin production. The findings showed that, in comparison to the control, methyl jasmonate markedly increased the levels of gene expression, antioxidant activity, and phenolic compound accumulation. These results imply that by upregulating secondary metabolism, methyl jasmonate is a promising elicitor for enhancing the medicinal activity of *C. officinalis*.

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Poster Presentation ID: 1510

Phytogenic Strategies for Promoting Poultry Respiratory Health: A Review of Natural Alternatives to Antibiotics

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ARTICLE INFO	ABSTRACT
Keywords: Medicinal Plants Respiratory diseases Avian Influenza Virus Poultry Ffection Bronchitis Virus	Respiratory diseases are considered one of the greatest health and economic challenges in the global poultry industry, causing substantial annual losses due to reduced production, increased treatment costs, and mortality. Traditional management of these diseases has primarily relied on vaccination and the use of antibiotics. However, growing concerns about antimicrobial resistance, drug residues in products, and consumer demand for natural products have created an urgent need for safe and effective alternatives. Medicinal plants and their active secondary metabolites, with a long history in traditional medicine, have emerged as promising options. Numerous studies have shown that extracts and essential oils of plants such as thyme, garlic, eucalyptus, echinacea, onion, and St. John's Wort possess antiviral, antibacterial, anti-inflammatory, and immunomodulatory properties in poultry. These effects can lead to a reduction in clinical signs, decreased viral shedding, enhanced immune response, and improvement in certain performance indicators. This review article aims to gather and critically analyze the existing scientific evidence in this field. A search of reputable international and domestic databases was conducted using relevant keywords. Relevant articles, including in vitro, in vivo, and review studies that examined the effect of medicinal plants on poultry respiratory diseases, were selected and reviewed. Overall, the results of this review indicate the significant potential of medicinal plants as alternatives or supplements in poultry respiratory disease control programs. However, the variability in study outcomes highlights the need for standardization of herbal products, determination of precise dosages, and further research to elucidate the mechanisms of action and prove efficacy under field conditions. Future research should focus on these challenges to enable the effective and sustainable use of these natural resources in the poultry industry.

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Poster Presentation ID: 1512

Chemical Composition of the Essential Oil Extracted from *Ferula assa-foetida* Oleo-gum-resin

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ARTICLE INFO

Keywords:

Ferula assa-foetida

Essential oil

Oleo-gum-resin

ABSTRACT

Ferula assa-foetida is one of the most important fodder, medicinal and industrial plants of Iran and the special importance of this plant is due to its oleo-gum resin (latex). Asafoetida is the dried latex exuded from the roots of some *Ferula* species, and possesses a strong sulfurous odour [1]. Asafoetida is characterized by several pharmaceutical properties, such as antimicrobial, antibacterial, antispasmodic, anti-inflammatory and muscle relaxant [2]. The objective of the present study is focused on the evaluation of the chemical composition of the essential oil from *F. assa-foetida* latex collected from two habitats of Iran (Fars and Kerman). Extraction of essential oil from the latex was performed by hydrodistillation method using Clevenger apparatus. The essential oils were analyzed by GC and GC-MS devices. Essential oils were obtained in yields of 11.67% and 9.85% (w/w) for Fars and Kerman, respectively. In the Fars population, 32 compounds were identified, comprising 98.2% of the total essential oil compounds, of which Z-propenyl-sec-butyl disulfide (22.0%), Z-propenyl-sec-butyl trisulfide (15.7%), E-propenyl-sec-butyl disulfide (14.6%), 10-epi- γ -eudesmol (8.9%), Z- β -ocimene (5.8%), and α -pinene (5.2%) were recorded as the major compounds. In the Kerman population, 25 compounds were identified, constituting 98.1% of the total oil components, of which E-propenyl-sec-butyl disulfide (53.1%), β -pinene (16.7%), Z-propenyl-sec-butyl disulfide (7.6%), and Z- β -ocimene (6.1%) were determined as the major constituents.

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Poster Presentation ID: 1513

Comparison of germination percentage of different ecotypes of Capper for mass production of seedlings

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ARTICLE INFO	ABSTRACT
Keywords: Desertification Stratification Scarification Capper	Sistan faces major environmental problems caused by drought such as dust, and more vegetation reduces the possibility of dust storms. Purchasing Capper (<i>Capparis spinosa</i> L.), as one of the important medicinal plants for desertification, from seedling production centers is expensive. On the other hand, propagating of this plant through seeds is difficult; so that under favorable environmental conditions, less than 5% germinate. With the aim of optimizing Caper seed germination, a factorial experiment based on a completely randomized design was conducted with three replications during the 2023 crop year. Capper seeds were collected from natural ecotypes (5 level) of Golestan, Sistan, Ilam, Esfahan, and Alborz. They were subjected to different seed priming treatments (ten level) (including: control, mechanical scarification, thermal scarification, washing under tap water, hormone therapy in two concentrations, stratification + acid washing, shaker + scarification, shaker + stratification, and wet chilling injury). The seedling trays were placed in a growth chamber with a daily temperature of $28 \pm 2^\circ\text{C}$ and a night temperature of $18 \pm 2^\circ\text{C}$ with a relative humidity of 70%. The germination percentage were measured one month after sowing. The data from this experiment were analyzed with SAS version 9.1 software and Excel software was used to draw graphs. The results of the data analysis variance indicated that, different seed priming treatments had a significant effect ($p \leq 0.05$) on the germination of Capper seed ecotypes; so that the lowest germination percentage (2 percent) was achieved in the control treatment and the highest germination percentage (90 percent) was achieved in the disinfection treatment with sodium hypochlorite + acid washing (Sulfuric acid 98%, 30 minutes) + tap water washing (10 minutes) + thermal scarification (hot water: cold water) + hormone therapy (Gibberellic acid 2000 ppm). The results of the present study confirm that Capper seeds have a very intelligent behavior in the germination process and for its commercial propagation, it is better to apply pre-germination treatments (priming) to facilitate and speed up germination.

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Poster Presentation ID: 1514

Stability of botanical extracts and active ingredients combined using hybrid nanoemulsion in nanotransfersomes

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ARTICLE INFO	ABSTRACT
Keywords: Nano trans-autosome Targeted-therapy Bioactive-extracts Antioxidant	Despite the high potential of plant-derived compounds in pharmaceutical, food, and cosmetic industries, their instability under environmental factors (light, oxidation, pH, and temperature) remains a major challenge. Recently, nanolipid carrier technology, particularly nanotransfersomes, has emerged as a promising solution to improve the stability and bioavailability of bioactive compounds. Nanotransfersomes are flexible nanostructures composed of phospholipid bilayers and surfactants, capable of encapsulating both hydrophilic and lipophilic compounds. In this study, nanotransfersomes were utilized to encapsulate plant extracts (e.g., curcumin and resveratrol) and bioactive compounds (e.g., antioxidants). The nanotransfersomes were prepared using the thin-layer hydration method, with optimization of parameters such as phospholipid-to-surfactant ratio. Dynamic Light Scattering (DLS) and Transmission Electron Microscopy (TEM) analyses confirmed the formation of particles with a size range of 80–120 nm and colloidal stability exceeding 8 weeks at 4°C. Accelerated stability tests (40°C, 75% humidity, 30 days) demonstrated that encapsulated curcumin retained 92% of its antioxidant activity, compared to 67% in free form. Additionally, controlled release of the compounds was observed over 72 hours in a simulated physiological environment. The enhanced stability was attributed to the protection of compounds against oxidative degradation and reduced permeability to external factor. This study highlights that nanotransfersomes not only improve the stability of plant extracts but also enhance their bioavailability through targeted absorption in gastrointestinal or dermal systems. This technology holds significant potential for developing stable formulations in pharmaceutical and food industries.

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Poster Presentation ID: 1516

Phytochemical Investigation of Methanolic Eextract of *Malva sylvestris*

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ARTICLE INFO	ABSTRACT
Keywords: <i>Malva sylvestris</i> Flavonoids HPLC analysis	<i>Malva sylvestris</i> is one of the medicinal plants commonly known as mallow in Europe, Iran, Pakistan and India. Traditionally, this plant has been used to treat various infections and diseases such as colds, burns, coughs, tonsillitis, bronchitis, digestive problems, eczema, and cut wounds under different weather conditions [1]. Extracts of <i>M. sylvestris</i> leaves and flowers are used to treat inflammatory diseases of the mucous membranes, cystitis, and diarrhea. The presence of malvin, delphinidin, malvidin, β-carotene, cyanine, tannins, saponins, alkaloids, and mucilage in this plant is responsible for its antioxidant, antimicrobial, antiviral, anti-inflammatory, and analgesic properties, which have been proved in laboratory studies [2]. In this project, <i>M. sylvestris</i> shoots were collected at the flowering stage from the research farm of Alborz Station. The plant tissue was extracted with methanol 80% (pH = 3) under ultrasonic waves at 50°C. Then the amount of significant phenolic and flavonoid compounds of the extract was measured by high-performance liquid chromatography (HPLC) analysis. A Kenover HPLC equipped with a K1000 pump, a Eurospher-C18 column (dimensions 250 mm $\times$ 4.6 mm; silica particle diameter 5 μm) and a K2500 UV detector was used. Standards were prepared in methanol at concentrations of 5-100 μg/mL and injected into the HPLC to construct a calibration curve. The column elution program was started with a gradient of 80:20 phosphate buffer (pH = 2.3) to methanol, reaching 20:80 after 25 minutes. The flow rate of the mobile phase was 1 mL/min, the monitoring wavelength was 280 nm, and the injection volume was 20 μL. According to the results, the contents of flavonoid and phenolic compounds in <i>M. sylvestris</i> extract are as follows: catechin (1.12 mg/g), chlorogenic acid (1.89 mg/g), caffeic acid (0.27 mg/g), rosmarinic acid (0.34 mg/g), salicylic acid (0.04 mg/g), rutin (0.73 mg/g), quercetin (5.93 mg/g), kaempferol (0.04 mg/g), apigenin (0.01 mg/g) and gallic acid (0.23 mg/g).

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Poster Presentation ID: 1517

An Ethnobotanical Study of Indigenous Knowledge and Multipurpose Plant Use among Seven Ethnic Groups in Northeastern Iran

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ARTICLE INFO

Keywords:

Traditional knowledge
Ethnicity
Pharmacology
Medicinal plants

ABSTRACT

Ethnobotanical studies in border areas and among different ethnicities are crucial in documenting traditional knowledge and plant resource utilization [1]. The present research aims to document local knowledge in the border regions of NE Iran (Khorassan-e Razavi province) and explore the various factors influencing the evolution of this knowledge. Seventy-four border villages and towns were visited from 2019 to 2022. Using snowball and convenience sampling methods, interviews were conducted with 97 individuals from Afghan, Baloch, Fars, Kurd (Kurmanj), Lak, Turk, and Turkmen ethnicities. The interviews were semi-structured and also included group discussions. The Jaccard index and Venn diagram were employed for quantitative analysis. Two hundred twenty-seven plant species belonging to 170 genera and 68 families were identified. The collected plants have applications in the fields of medicine (171 species), food (86), industrial (26), ethnoveterinary medicine (19), food-medicine (16), economic (4), ritual (4). Reported common diseases included stomach aches, internal infections, constipation, colds, and diabetes. Some species such as *Ziziphora clinopodioides*, *Teucrium polium*, and *Achillea wilhelmsii*, were most frequently reported for disease treatment. The use of 33 plant species and the new uses of 133 species were recorded for the first time by the present study. Results of this study unravels exciting connections between geography, culture, and traditions. These different ethnic groups, such as the Fars, Turk, Kurmanj, and Lak, each have unique traditions regarding using local plants. However, they also share the use of certain plant species, suggesting a more profound cultural connection between these groups. The present research shows how environmental factors and ethnic backgrounds influence the way people use plants. This study enhances our understanding of the region's ethnobotanical heritage and highlights the importance of conservation and ethical considerations in utilizing and commercializing plant knowledge. The findings also highlight a diverse list of plants used for treatments and a wide range of applications. Phytochemical and pharmacological studies are recommended to determine the efficacy and safety of the plant species used.

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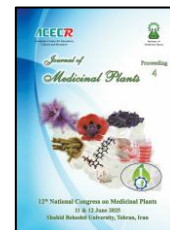
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Poster Presentation ID: 1519

Influence of biochar and bio-GME Fertilizers on Growth Performance and Secondary Metabolite Production in Garlic (*Allium sativum*)

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ARTICLE INFO

Keywords:

Garlic
Biochar
Biojmi Fertilizer
Secondary Metabolites
Yield Components

ABSTRACT

Garlic (*Allium sativum*) is a perennial herb widely known for its nutritional and therapeutic properties, primarily attributed to sulfur-containing compounds such as allicin and diallyl sulfide. These compounds are responsible for its antibacterial, antifungal, anti-inflammatory, antioxidant, and anticancer effects. Garlic has been used for centuries in traditional medicine to treat conditions including hypertension, asthma, diabetes, and gastrointestinal disorders. With the increasing demand for plant-derived bioactive compounds, improving garlic yield and quality has become essential. This study assessed the effects of biochar and Bio-GME organic fertilizers on garlic yield, growth traits, and secondary metabolite production. A field trial was conducted at the University of Mohaghegh Ardabili using a randomized complete block design with four replications and eight treatment combinations. Bio-GME was applied at rates of 150, 300, 450, and 600 g/plot, and biochar at 500, 1000, 1500, and 2000 g/plot. Measured traits included plant height, number of leaves, crown diameter, fresh and dry weight, total phenolic content, and antioxidant activity. Most traits showed no statistically significant differences among treatments. However, the 600 g Bio-GME treatment resulted in a significant increase ($p < 0.01$) in the number of aerial cloves compared to the control. The 300 g Bio-GME treatment produced the highest dry weight and crown diameter, though not statistically significant. Biochar showed minimal impact under the conditions of this study. These findings suggest that moderate to high doses of Bio-GME may enhance garlic productivity, particularly with long-term application or in nutrient-deficient soils, while the effectiveness of biochar may depend on prolonged use or different soil characteristics.

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Poster Presentation ID: 1521

Introducing the medicinal properties of the Russian Olive plant (*Elaeagnus angustifolia*)

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ARTICLE INFO

Keywords:

Traditional medicine

Anti-bleeding

Vitamin C

Kidney cleansing

ABSTRACT

The Russian olive (*Elaeagnus angustifolia*) is a deciduous plant belonging to the Elaeagnaceae family, which is called Ghabira in Arabic and Ikide in Turkish. Its other names include Tbarkhon, Nafdar, Gorgan elderberry, Silane, Shilaneh, Tafah Beri, Sib Koochi, Arj, Jilan, and Pestankak. The color of its broad leaves is grayish green on the upper surface and silvery white on the lower surface. Its flowers are white or yellow in clusters and are very fragrant. This tree grows mostly in regions with a temperate and cold climate and grows in clusters throughout Iran. Its fruit has a red or yellow skin and is relatively large. The elderberry kernel resembles a date. Its distribution centers in Iran are: Azerbaijan, Ghara Dag, Uroumia, Kalibar, Sanandaj, Kermanshah, Hamedan, Isfahan, Shiraz, Baluchestan, Khorasan, Torbat Heydarieh, Tehran, Tochal, Qazvin and Ghom. Its temperament is cold and dry, which is in the first place in terms of cold and dryness. The following are the prominent properties of its fruit in traditional medicine: treating diarrhea, relieving gallbladder swelling, reducing body temperature, removing excess moisture from the body, diuretic, cleansing the kidneys, sedative, suitable for colds (containing vitamin C), reducing nausea, reducing menstrual bleeding, eliminating frequent urination and hiccups, cleansing the stomach, treating jaundice, relieving joint pain, treating fluid in the lungs and lung infection, relieving migraine pain, treating hemorrhoids and repairing fractures, preventing osteoporosis. The nature of the elderberry flower blossom is warm and dry and is used as a stimulant of women's libido, relieving joint weakness and helping hair growth (with olive oil). Side effects of excessive consumption of senjead include constipation, indigestion, and urinary tract infections.

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Poster Presentation ID: 1522

Investigating the Antiparasitic, Antioxidant and Cytotoxicity of *Ferula macrecolea* Essential oil on Breast (MCF-7) and Prostate (LNCaP) Cancer Cells

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ARTICLE INFO

Keywords:

Ferula macrecolea

Antioxidant

Cytotoxicity

Essential oil

Cancer

ABSTRACT

Giardia lamblia is one of the important intestinal protozoa in humans and many mammals and is transmitted via the fecal-oral route [1]. Fresh stool samples were taken from patients visiting university hospitals in Khorramabad city who were infected with cysts. The essential oil of *Ferula macrecolea* [2] was extracted from aerial parts which were collected, dried, powdered, and stored in dark containers. The effects of the plant's essential oil were compared with the control group (physiological saline). Concentrations of 50, 100, and 200 µg/mL were determined based on previous studies, and mouse macrophages (105 cells/mL) were cultured. Cytotoxicity and viability were evaluated via MTT assay, antioxidant via DPPH assay, and statistical via SPSS version 25, independent t-tests, one-way ANOVA, and Tukey's posthoc test. Three cell lines MCF-7, LNCaP, and SKM were cultured and exposed to different concentrations. Results show increasing the concentration of *Ferula macrecolea* essential oil kills *Giardia* cysts absolutely at 200 µg/mL. The antiparasitic effect differed significantly from both control and metronidazole. The essential oil did not show significant cytotoxicity against HEK293 normal cells. The IC₅₀ was 207.4 µg/mL for essential oil and 236.4 µg/mL for metronidazole. The MTT assay showed viability of SKM normal cells decreased concentration-dependently with treatment via the essential oil, also for MCF-7 breast cancer cells (P<0.001), with a IC₅₀ of 136.7 µg/mL for breast cancer cells, so as LNCaP prostate cancer cells (P<0.001), with a IC₅₀ of 171.4 µg/mL. The essential oil demonstrated concentration-dependent antioxidant activity. The IC₅₀ was 89.6 µg/mL for essential oil and 5.3 µg/mL for BHT.

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Poster Presentation ID: 1523

Assessing Morphological and Phytochemical Diversity in *Calendula* Species from Northern Iran (Golestan Province)

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ARTICLE INFO	ABSTRACT
Keywords: <i>Calendula</i> Medicinal plants Asteraceae Flavonoid Carotenoid	Evaluating morphological and phytochemical traits is essential for understanding plant diversity, identifying elite genotypes, and guiding breeding and conservation strategies. This study investigated eight <i>Calendula</i> populations collected from the Gonbad and Aq-Qala regions in Golestan Province, Iran, combining morphological and phytochemical analyses to assess intra- and inter-population variation. Significant morphological diversity was observed, particularly in flower traits (height and diameter), leaf dimensions, shoot and root biomass, and reproductive characteristics. Among the studied species, <i>Calendula karakalensis</i> exhibited the tallest (27.98 mm) and widest (26.75 mm) flowers—a first record for Golestan Province. <i>C. arvensis</i> had the longest leaves (76.29 mm), while <i>C. karakalensis</i> displayed the broadest leaf blades (28.20 mm). <i>C. arvensis</i> (syn. <i>C. persica</i>) showed superior performance in fresh shoot weight (155.4 g), number of main stems (7.5), flowers per plant (65.8), and fruit count (47.5), along with the highest fresh root weight (1.4322 g). Statistical analyses confirmed significant differences ($p < 0.01$) in root weight, root length, and plant height, while flower and fruit numbers varied significantly at $p < 0.05$. Phytochemical analysis revealed that <i>C. arvensis</i> had the highest leaf flavonoid content (61.76 mg/g dry weight), while its flowers and those of <i>C. palestina</i> contained peak flavonoid levels (70.26 and 40.14 mg/g, respectively). Additionally, <i>C. arvensis</i> (code 7) accumulated the highest carotenoid content (89.85 mg/g). These findings highlight substantial morphological and phytochemical diversity among <i>Calendula</i> species in northern Iran, underscoring their potential for medicinal applications, agricultural development, and genetic improvement programs.

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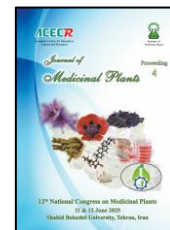
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Poster Presentation ID: 1524

Advances in phenolic compounds and antioxidants of citrus flowering

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ARTICLE INFO	ABSTRACT
Keywords: Antioxidant activity <i>Citrus</i> Spp. Petal Phenolic compounds	<i>Citrus</i> species are important sources of phenolic compounds that can act as natural antioxidants, antimicrobials, and anti-inflammatory agents. Antioxidants can protect cells from oxidative stress. Their potential role has not been investigated in citrus flowering. Therefore, the study aims to compare the secondary metabolites of flowers in different citrus species including trifoliolate orange, Citrange, Citumelo and sour orange. This research was conducted in a factorial experiment based on the randomized complete block with three replications. The results showed that the total phenolic and flavonoid content in the trifoliolate orange petal was higher than other species (1.7 mg.g⁻¹ DW and 1.2 mg.g⁻¹ DW respectively), While the Citumelo petal had the lowest content (0.22 mg.g⁻¹ DW and 0.16 mg.g⁻¹ DW respectively). The Citrange petal was identified by higher antioxidant activity (%83). In addition, a significant positive correlation was demonstrated between their phenolic compounds and antioxidant activity. These results suggest the use of trifoliolate orange flowers due to their high phenolic compounds for medicinal and perfumery purposes.

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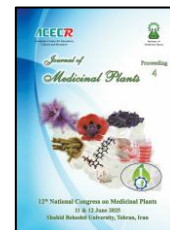
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Poster Presentation ID: 1525

Investigation of phycocyanin accumulation in *Spirulina (Arthrospira) platensis* under the influence of different chromium concentrations

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ARTICLE INFO

Keywords:

Phycocyanin
Spirulina
Biotechnology
Diabetes

ABSTRACT

Phycocyanin is a pigment-protein complex from the phycobiliprotein group obtained from blue-green algae that has various applications in food and pharmaceutical technologies. It is a natural colorant for food and cosmetic products. This study aimed to investigate the accumulation of phycocyanin under the influence of different concentrations of chromium. Given that elements are indicators of changes in phycocyanin accumulation in blue-green algae, different concentrations of chromium were used in this study. In addition to stimulating cells to accumulate phycocyanin, this element acts as an elicitor and can help treat type 2 diabetes. For this purpose, *Spirulina platensis* was prepared from the algae collection of the Marine Biology Department of Tarbiat Modares University. Five treatments were selected for cultivation: treatment 1 (control), and 4 treatments with different doses of chromium oxide (CrO) added to the culture medium. Cultivation was carried out at 28 ± 2 °C and with a light/dark cycle of 15.9 h for 14 days. After the end of the cultivation, the samples were dried with a freeze dryer. The method used in phycocyanin extraction is soaking, which is one of the simple methods that is widely used in small and industrial scale with the help of phosphate buffer solvent. In order to break the walls, ultrasonic waves were used at a temperature of 4 °C with a frequency of 80 Hz and a duration of 15 minutes. In order to extract phycocyanin, the samples were centrifuged at 8000 rpm and a temperature of 4 °C for 20 minutes, and in the next step, the supernatant was precipitated with 50% saturated ammonium sulfate. The supernatant solution was centrifuged in the cold at 10000 rpm for 20 minutes and mixed with 5 mM phosphate buffer with pH 8.6. Extraction was performed with the help of a 14 kDa dialysis bag. UV-VIS spectrophotometer was used for measurement at wavelengths of 620 nm and 652 nm. The results were analyzed using SPSS version 36 software. The results of the present study showed that the amount of phycocyanin pigment in the treatments was 5.5, 8.86, 5.91, 8.4 and 6.9% respectively. For purification of the obtained phycocyanins, treatment 2, which had the highest percentage of phycocyanin accumulation, was selected and 15.8% phycocyanin was obtained. The results of the present study showed that chromium can affect the accumulation of phycocyanin in *Spirulina* algae. In such a way that increasing the amount of chromium in the culture medium reduces the accumulation. With purification, its percentage increased significantly. The general conclusion is that using chromium to a certain extent during the cultivation process can increase phycocyanin in *Spirulina*. This cyanobacterium can be a suitable supplement for diabetics because, according to published research results, phycocyanin has been effective in improving type 2 diabetes.

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Poster Presentation ID: 1526

In Vitro Flowering of Saffron (*Crocus sativus* L.) Using Plant Growth Regulators

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ARTICLE INFO

Keywords:

Crocus sativus

In vitro flowering

Dormancy breaking

Growth regulators

ABSTRACT

Saffron (*Crocus sativus* L.), recognized as the most valuable spice in the world, plays a significant role in the food, pharmaceutical, and cosmetic industries. Its bioactive compounds, including crocin, picrocrocin, and safranal, possess strong anticancer, anti-inflammatory, antidepressant, and antioxidant properties. Due to the decline in saffron yield in recent years and the urgent need to enhance productivity, studies on in vitro flowering have gained increasing importance. Investigating the flowering process under controlled conditions can optimize flower production and identify key factors affecting the growth and development of reproductive organs, with significant implications for both greenhouse and open-field cultivation. In this study, for the first time, an attempt was made to induce in vitro flowering in saffron. Healthy corms with an average weight of 13.75 g were surface sterilized and cultured on MS medium supplemented with various concentrations of BA, kinetin, and their combinations with NAA. To break bud dormancy, the corms were stored at 10.5°C for 10 days, followed by incubation at 17°C. Approximately three weeks after culture initiation, bud sprouting was observed, and after 60 days, 25% of the treated samples successfully flowered under in vitro conditions. The highest flowering rates were recorded in treatments containing BA (2 and 3 mg/L), kinetin (1 and 3 mg/L), and combinations of BA or kinetin with NAA (0.1 mg/L), whereas no flowering was observed in control treatments. These findings demonstrate that the proper regulation of hormonal concentrations, in combination with targeted cold treatment, plays a crucial role in breaking dormancy and inducing flowering under in vitro conditions. The results of this research can be applied to develop strategies aimed at improving saffron yield in commercial cultivation systems.

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Poster Presentation ID: 1527

Preparation and characterization of Quercetin-Loaded Lemongrass oil nanoemulsions for enhanced dermal delivery

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ARTICLE INFO	ABSTRACT
Keywords: Anti-inflammation Nanoemulsion Quercetin Lemongrass essential oil Permeability	Quercetin, a naturally occurring polyphenolic flavonoid known for its potent anti-inflammatory, antioxidant, and free radical scavenging activities, remains a promising candidate for managing inflammatory skin disorders [1,2]. To address its limited solubility and enhance topical bioavailability, quercetin was encapsulated into a nanoemulsion using lemongrass essential oil (<i>Cymbopogon citratus</i>) [3]. The nanoemulsion was produced via spontaneous emulsification, and key formulation parameters—including <i>C. citratus</i> oil concentration, surfactant ratio, and quercetin loading—were optimized by Design of Experiments (DoE) approach. The prepared nanoemulsions were characterized using dynamic light scattering (DLS), zeta potential, transmission electron microscopy (TEM), and UV analysis. The optimized nanoemulsion presented droplet sizes below 100 nm, a low polydispersity index (<0.3), and encapsulation efficiency greater than 85%. Incorporation of collagen into the topical gel base further enhanced skin permeability and modulated the drug release profile. In vitro release studies employing Franz diffusion cells with egg albumin membrane demonstrated quercetin release over 24 hours. The collagen-enriched lemongrass oil-based nano-emulsion gel showed superior permeability compared to the non-collagen formulations. Rheological evaluation indicated suitable viscoelastic properties for topical application and retention. Accelerated stability tests confirmed physicochemical stability over time. The synergistic effect of quercetin's bioactivity, lemongrass essential oil as a natural carrier, and collagen's permeation enhancement successfully improved dermal delivery and controlled release in vitro. This formulation represents a promising therapeutic approach for effective topical treatment of inflammatory skin diseases.

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Poster Presentation ID: 1528

Physiological Response of Safflower (*Carthamus tinctorius* L.) to Arbuscular Mycorrhizal Fungi and Phosphate Barvar-2 under Drought Stress Conditions

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ARTICLE INFO	ABSTRACT
Keywords: Arbuscular Mycorrhiza Biofertilizer Drought Stress Phosphate Barvar-2 Safflower	To investigate the effects of arbuscular mycorrhizal biofertilizers and Phosphate Barvar-2 on certain physiological traits of safflower under drought stress conditions, an experiment was conducted at the research farm of the Faculty of Agriculture, Yasouj University. The experiment was arranged as a split-plot design based on a randomized complete block design with three replications. Irrigation regimes were considered the main factor at three levels: no stress (I1; full irrigation), irrigation withholding at flowering–pollination stage (I2), and irrigation withholding at grain filling stage (I3). Biofertilizer treatments were assigned to subplots with four levels: control (B1), Phosphate Barvar-2 (<i>Pantoea agglomerans</i> P5 and <i>Pseudomonas putida</i> P13; B2), arbuscular mycorrhiza (<i>Glomus mosseae</i>; B3), and the combination of mycorrhiza + Phosphate Barvar-2 (B4). The results indicated that drought stress at stage I3 resulted in the lowest leaf nitrogen content and the highest grain nitrogen content compared to I1. Combined application of biofertilizers (B4) increased leaf and grain nitrogen content by 37.85% and 43.71%, respectively, compared to the control (B1). Total leaf chlorophyll content declined with increasing drought stress, but the B4 treatment under I3 stress exhibited the highest total chlorophyll content (0.433 mg.g⁻¹ FW). Furthermore, drought stress during grain filling enhanced the activity of the non-enzymatic defense system. In this context, the B4 treatment led to the highest levels of proline (2.23 μmol.g⁻¹ FW) and soluble protein (7.82 mg.g⁻¹ FW) under I3 stress. Additionally, under I1, I2, and I3 conditions, B4 treatment increased grain yield by 22%, 30%, and 16.5%, respectively, compared to B1. Under drought stress, mycorrhiza + PGPR enhanced nitrogen uptake and translocation, supported chlorophyll synthesis, and maintained photosynthesis [1]. Non-enzymatic defense also protected photosynthetic structures [2]. Thus, their integration effectively improves safflower performance under drought.

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Poster Presentation ID: 1529

Improvement of Tissue-Cultured Vanilla Plantlet Acclimatization in Greenhouse Conditions Using Bio-nanocomposites

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ARTICLE INFO

Keywords:

Bio-nanocomposites
Acclimatization
In vitro propagation
Tissue culture
Vanilla planifolia

ABSTRACT

Vanilla (Vanilla planifolia), the world's second most expensive spice, is currently endangered due to habitat destruction and excessive harvesting. Tissue culture offers a viable method for the mass propagation of this species; however, the acclimatization phase remains one of the major challenges in this process. This stage involves transferring plantlets from laboratory conditions to greenhouse or outdoor environments, where they are exposed to environmental stresses. Common problems during this transition include poor water absorption, inadequate root development, and a deficiency of essential nutrients required for survival. Bio-nanocomposites have emerged as innovative tools to overcome the challenges associated with plant acclimatization. These materials, composed of nanoparticles with specific properties combined with biological compounds, can effectively reduce plant transpiration and minimize excessive water loss. Additionally, certain bio-nanocomposites have the ability to stimulate root growth, thereby reducing the time required for acclimatization. This study represents the first investigation on the acclimatization of tissue-cultured vanilla plantlets using bio-nanocomposites in combination with plant growth regulators (PGRs). The treated plantlets were monitored under greenhouse conditions (temperature: 25±2°C; humidity: 70–80%). Survival rates were recorded weekly. The results showed that treatment with bio-nanocomposite alone (without PGRs) resulted in 100% plantlet survival, whereas the untreated control group experienced a 75% mortality rate. Furthermore, by the end of the second week, all treated plantlets were successfully acclimatized, indicating the positive impact of bio-nanocomposites in reducing acclimatization time and enhancing plantlet survival under greenhouse conditions. These findings suggest that bio-nanocomposites can serve as promising tools to improve the acclimatization phase of tissue-cultured plants and enhance their performance in controlled environments.

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Poster Presentation ID: 1530

Rediscovery of *Medicago brachycarpa* from Iran

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ARTICLE INFO	ABSTRACT
Keywords: Medicago Trigonella <i>Trigonella brachycarpa</i> Rare species Flora of Iran	The genus <i>Medicago</i> L. comprises of about 91 species naturally distributed in Eurasia and Africa, but some species have also been introduced into Americas and Australia. These plants are a source of biologically active compounds such as flavonoids and saponins. Furthermore, <i>Medicago</i> is famous for its species used as forage crops. <i>Medicago</i> is represented with 33 species in Iran. These plants are mostly distributed throughout the Zagros, Alborz, Khorassan and Azerbaijan mountains. <i>Medicago brachycarpa</i> Fisch. ex M.Bieb. as a very rare species in Iran, was known based on a single collection from Arasbaran (as <i>Trigonella brachycarpa</i>). This species is here reported from West Azerbaijan (West Urmia, valley of Anbi) as the second record for the flora of Iran. The general distribution range of <i>M. brachycarpa</i> includes Ukraine, Türkiye, Lebanon, Syria, Iraq, Transcaucasia and Iran. <i>M. brachycarpa</i> could be distinguished from other close relatives by characteristics of its calyx (3 mm long with linear-subulate teeth) and fruits (4-6 mm long, deflexed, flat, half-ovate, shortly beaked and eglandularly haired). <i>M. brachycarpa</i> inhabits rocky mountainous slopes at altitudes from 2000 to 2400 m a.s.l. in West Azerbaijan. In the area, this plant shares its habitat with <i>Aethionema grandiflorum</i>, <i>Centranthus longiflorus</i> Steven, <i>Daphne mucronata</i>, <i>Globularia trichosantha</i>, <i>Salvia multicaulis</i>, <i>Sedum album</i>, <i>Thymus fedtschenkoi</i>, <i>Ziziphora capitata</i>, and <i>Z. clinopodioides</i>. In the current habitat, <i>M. brachycarpa</i> is flowering from late May to middle June, and is fruiting from early June to middle July.

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Poster Presentation ID: 1531

Effects of Topical Garlic Oil on Prostate Volume and PSA Indices in Patients with Benign Prostatic Hyperplasia: A Retrospective Clinical Study

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ARTICLE INFO

Keywords:

Garlic oil
Benign prostatic
hyperplasia (BPH)
Prostate volume
PSA
Traditional medicine

ABSTRACT

Benign prostatic hyperplasia (BPH) is a common, nonmalignant enlargement of the prostate gland affecting a significant proportion of aging men, often accompanied by lower urinary tract symptoms and elevated prostate-specific antigen (PSA) levels. Limitations in the efficacy and tolerability of conventional pharmacotherapies have prompted growing interest in phytotherapeutic agents. Garlic (*Allium sativum*) has demonstrated anti-inflammatory, antioxidant, and antiproliferative activities, suggesting potential utility in the management of BPH. This retrospective clinical investigation analyzed the medical records of 60 male patients who attended Dr. Qadir Mohammadi's Health Center in 2024 (1403 SH). Inclusion criteria comprised complete documentation of pre- and post-intervention measurements of total PSA, free PSA, FPSA/PSA ratio, and prostate volume. All participants applied topical garlic oil to the perineal region once daily over a continuous four-month period. Data were processed using SAS software version 9.3.1. As data distribution violated normality assumptions (Shapiro-Wilk test, $p < 0.05$), non-parametric Wilcoxon signed-rank tests were employed. Results revealed a statistically significant reduction in total PSA from 6.86 ± 2.11 to 4.67 ± 1.86 ng/mL ($p = 0.0005$), alongside a notable decrease in prostate volume from 63.50 ± 7.46 to 48.96 ± 8.16 mL ($p = 0.0005$). The FPSA/PSA ratio increased significantly from 0.20 ± 0.11 to 0.31 ± 0.14 ($p = 0.0005$), indicating a potential shift toward a more favorable PSA profile. However, the change in free PSA levels (1.08 ± 0.22 to 0.96 ± 0.25 ng/mL) was not statistically significant ($p = 1.0000$). These findings suggest that topical garlic oil may provide clinically meaningful benefits in reducing prostate volume and PSA indices in BPH patients. Previous studies have demonstrated that garlic-derived compounds, such as diallyl disulfide, inhibit prostatic hyperplasia through modulation of androgen signaling and apoptosis induction [1]. Moreover, observational evidence suggests that habitual garlic intake is inversely associated with BPH incidence and urinary symptoms [2]. These results warrant further randomized controlled trials to validate the therapeutic potential of garlic-based interventions in BPH management.

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Poster Presentation ID: 1532

Morphological diversity of *Tragopogon collinus* in central regions of Iran

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ARTICLE INFO	ABSTRACT
Keywords: Morphological diversity Medicinal plants Phenotypes <i>Tragopogon collinus</i>	<i>Tragopogon collinus</i>, a perennial herbaceous species belonging to the Asteraceae family, grows wild in mountainous, arid, and semi-arid regions of Iran. In addition to its nutritional value, this species is widely utilized in traditional medicine due to its various pharmacological properties, including anti-inflammatory, diuretic, and gastrointestinal-stimulant effects. The present study was conducted to evaluate the morphological diversity of <i>T. collinus</i> populations in Markazi and Isfahan provinces. For this purpose, samples were collected from six different locations in Markazi Province, Shahabieh, Yaman, Heshmatieh, Robat Morad, Zereshek, and Darband and one location in Isfahan Province, Golpayegan. The morphological analysis was included leaf length, leaf width, leaf number, root length, root diameter, and fresh biomass weight. Analysis of variance revealed statistically significant differences ($p < 0.01$) among the populations for all measured treatment, indicating a high level of morphological variation. The Golpayegan population exhibited the highest leaf length (20.81 cm), root diameter (1.28 cm), and leaf number (17.2), suggesting it as a potential candidate for introduction in cultivation system. Heshmatieh showed the greatest leaf width (1.19 cm). The Shahabieh population demonstrated the highest root length (5.9 cm), while the greatest fresh biomass weight (9.8 g) was observed in Golpayegan. This observed morphological diversity highlighted the potential of these native populations for use in breeding programs, germplasm conservation, and the development of high-yielding, stress-tolerant cultivars for both medicinal and agricultural applications.

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Poster Presentation ID: 1533

Identification of the Key Environmental Factors Influencing the Distribution of Persian Oak (*Quercus brantii*) in the Zagros Forests Using the Maxent Model

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ARTICLE INFO

Keywords:

Iranian oak
Zagros Forest
Conservation
Climatic factors
Modeling

ABSTRACT

The increasing mortality of trees in forests worldwide is a complex phenomenon with unclear causes, often associated with climate-related stressors such as rising temperatures, drought, pests, and diseases. These factors have direct and indirect effects on ecosystem functioning, including reduced primary productivity and alterations in nutrient and biogeochemical cycles [1]. Iran, located in the Irano-Turanian region—characterized by arid and semi-arid climates with mild to cold winters—hosts two major forest regions: the Hyrcanian forests in the north and the Zagros forests in the west. In recent years, the Zagros forests, dominated by Persian oak (*Quercus brantii* Lindl), have experienced a significant decline. This study aims to support the conservation and restoration of this valuable ecosystem by identifying key climatic and edaphic factors influencing the distribution of this species using the Maxent model [2]. Results showed that among the 38 variables analyzed, slope, precipitation of the coldest quarter (BIO19), and bedrock depth had the highest influence on Persian oak distribution. Slope was the most influential factor (37.7%) due to its effects on water flow, soil aeration, and moisture distribution. Precipitation of the coldest quarter (35.2%) was also significant, affecting water availability during this critical period. Other influential factors included bedrock depth (9.7%), precipitation of the driest month (BIO14) (7.1%), and precipitation seasonality (BIO15) (4.9%). These findings demonstrate that climatic and environmental variables have varying impacts on the growth and stability of Persian oak and provide valuable insights for natural resource management, forestry, and ecosystem restoration and conservation planning.

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Poster Presentation ID: 1535

Effect of Different Storage Media on the Long-Term Viability of *Pseudomonas* at Room Temperature

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ARTICLE INFO

Keywords:

Encapsulation
Pseudomonas spp.
Bacterial viability
Bacterial preservation
Room storage

ABSTRACT

Bacterial biofertilizers, particularly *Pseudomonas* species, are widely used in sustainable agriculture to enhance soil fertility and promote plant growth. The effectiveness of these biofertilizers greatly depends on the survival of the bacterial strains during storage, especially under non-refrigerated conditions. This study aimed to evaluate the long-term viability of *Pseudomonas* in various carrier formulations stored at room temperature for 210 days. Initially, *Pseudomonas* was cultured in King's B liquid medium for 24 hours. The bacterial suspension was then transferred to six different carrier media, two of which involved encapsulation systems—one oil-based (medium 3) and the other Span-Tween-based (medium 6). At the end of the storage period, bacterial viability was assessed by colony-forming unit (CFU) counts on nutrient agar. The highest bacterial survival was observed in medium 5, which contained 15% glucose (9.4×10^{11} CFU). This was followed by medium 4 (7% glucose; 8×10^{10} CFU), medium 2 (control; 6×10^{10} CFU), and medium 1 (activated charcoal 1:4; 2×10^{10} CFU). No bacterial growth was detected in the encapsulated formulations (media 3 and 6), suggesting a complete loss of viability. These results indicate that sugar-based formulations, particularly those containing glucose, significantly enhance the long-term viability of *Pseudomonas* at room temperature. In contrast, the encapsulation methods tested in this study were not only ineffective but may have had detrimental or even bactericidal effects on the cells. The findings emphasize the importance of selecting appropriate carrier materials for the storage of biofertilizers and suggest that simple, carbohydrate-rich formulations may be preferable for maintaining bacterial viability in practical agricultural applications. Further research is needed to optimize encapsulation techniques that do not compromise microbial survival.

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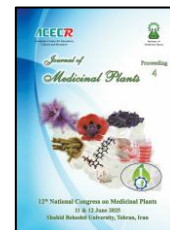
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Poster Presentation ID: 1537

Modeling the Potential Distribution of (*Vitex agnus-castus* L.) in Iran Using the MaxEnt Approach: Identifying Key Environmental Determinants

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ARTICLE INFO

Keywords:

Vitex agnus-castus L.
MaxEnt model
species distribution
environmental factors

ABSTRACT

Many key rangeland species, particularly in steppe regions, are endangered due to improper land use practices. The loss of these species leads to significant environmental crises [1]. *Vitex agnus-castus* L., a valuable medicinal plant belonging to the Verbenaceae family, is one such species. In this study, the MaxEnt species distribution model was used to identify the key environmental variables influencing the distribution of this plant [2]. Results indicated that the minimum temperature of the coldest month (31.8%), solar radiation (21.1%), geology (21.1%), soil sand content (13.6%), precipitation in the driest season (12.5%), and isometry (2.1%) are the most important factors affecting its distribution. *Vitex agnus-castus* shows optimal performance in temperate regions with mild winters and requires a minimum temperature above -5°C. It also depends on moderate solar radiation (~1000 $\mu\text{mol}/\text{m}^2/\text{s}$) and well-drained sandy soils. Moderate precipitation during the dry season is also essential for its growth. Identifying these factors can aid in selecting suitable regions for the cultivation and sustainable use of this medicinal species.

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Poster Presentation ID: 1538

Synthesis of Silver Nanoparticles Using Aqueous Extract of *Crataegus aronia* Leaves and Evaluation of its Antioxidant, Anti-bacterial, and Anticancer Effects

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ARTICLE INFO

Keywords:

Crataegus aronia
Silver nanoparticle
FRAP
Anti-bacterial
HeLa cell lines

ABSTRACT

Cancer is regarded as one of the main causes of mortality globally, characterized by the unregulated proliferation of aberrant cells inside the body [1-2]. For that, the leaves extract of *Crataegus aronia* (*C. aronia*) was used to mediate silver nanoparticle (Ag-NPs) synthesis, and its antioxidant, anti-bacterial, and anticancer effects were evaluated. The characterization of Ag-NPs was done using different techniques: UV-Vis spectroscopy, FT-IR spectroscopy, scanning and transmission electron microscopy (SEM and TEM), and X-ray diffraction. The antioxidant and anti-bacterial activities were assessed using two methods for each. Anti-cancer potential was evaluated by means of the MTT assay. Phytochemical screening demonstrated the richness of the plant in different biomolecules. UV-Vis spectra showed a peak at 422 nm. The crystalline structure of the phyto-synthesized Ag-NPs was confirmed by XRD, and the grain size was estimated to be 30.08 nm. Furthermore, the obtained nanoparticles exhibited remarkable antioxidant activity, with IC₅₀ values of 3.47 µg/ml and 96.52 µg/ml for DPPH⁰ and FRAP tests, respectively. The synthesized AgNPs showed antibacterial activity against Gram- positive bacteria (*Staphylococcus aureus*) and Gram-negative bacteria (*Escherichia coli*), with the greatest activity observed against *Staphylococcus aureus*. The cytotoxicity of *C. aronia*-mediated synthesized Ag-NPs against HeLa cell lines disclosed a dose-dependent efficacy. In conclusion, our research suggests that *C. aronia* leaves aqueous extract can be used as reducing and stabilizing agents for the green synthesis of Ag-NPs, which provided antioxidant, anti-bacterial, and anticancer effects.

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Poster Presentation ID: 1539

Synergistic Effects of Curcumin and Bacteriophages Against Methicillin-Resistant *Staphylococcus aureus* (MRSA)

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ARTICLE INFO	ABSTRACT
Keywords: Curcumin Bacteriophage Methicillin-resistant <i>Staphylococcus aureus</i> Synergy Antibiotic resistance.	Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) is a major public health threat due to its resistance to conventional antibiotics, complicating treatment of hospital- and community-acquired infections. Curcumin, a natural antimicrobial compound, and bacteriophages, bacteria-specific lytic viruses, are promising alternatives. This study explores their synergistic effects against MRSA in laboratory settings. Standard and clinical MRSA strains were sourced from microbial collections. Curcumin ($\geq 98\%$ purity) and MRSA-specific lytic bacteriophages were isolated from environmental samples. Antimicrobial activity was assessed by determining minimum inhibitory concentrations (MICs) individually and in combination using the microbroth dilution method. Synergy was evaluated via the fractional inhibitory concentration index (FICI). Biofilm inhibition was quantified with crystal violet staining and fluorescence microscopy. Mechanisms, including curcumin's disruption of bacterial membranes and enhanced phage penetration, were studied using membrane staining and gene expression analysis. The curcumin-bacteriophage combination reduced MICs up to 4-fold and biofilm formation by 70% compared to individual treatments. A FICI < 0.5 confirmed strong synergy. The combination accelerated membrane disruption and suppressed resistance gene expression, with consistent effects across resistant clinical strains. Curcumin and bacteriophages exhibit potent synergy against MRSA in vitro, reducing required doses and potentially limiting new resistance. Clinical trials are needed to confirm efficacy and safety in humans. This approach could complement existing therapies for antibiotic-resistant infections.

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Poster Presentation ID: 1540

Synthesis of ZnO nanoparticles using *Astragalus tragacantha* aqueous extract and evaluation of its antibacterial effects on some human pathogens

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ARTICLE INFO

Keywords:

Medicinal plants
Hydroalcoholic extract
Gardnerella vaginalis
4Disk diffusion
MIC

ABSTRACT

Green production of nanoparticles is an environmentally friendly method in which natural solvents are used. Green nanoparticle synthesis methods have priority over physical, chemical and physical methods due to lower costs, time and energy. The purpose of this study is to synthesize zinc oxide nanoparticles in green and evaluate the antibacterial activity of these nanoparticles. In this experimental study, aqueous extract of *Astragalus tragacantha* was combined with 1: 1 molar sulfate solution 1: 1 and stored at room temperature for 15 minutes to make nanoparticles. Synthesis of zinc oxide nanoparticles was confirmed by spectrophotometric methods, mean diameter of nanoparticles, X-ray diffraction and electron microscopy (SEM). Then, the MIC of the oxidation nanoparticles was measured on standard strains of *Staphylococcus aureus* 1431PTCC, *Bacillus cereus* 1015PTCC and *Escherichia coli* 1399PTCC, *Pseudomonas aeruginosa* 1571PTCC. Absorption peak of zinc oxide nanoparticles was observed at 350 nm. The nanoparticles of ZnO were spherical in shape with a SEM technique and about 50-40 nm in size. The highest MIC was found on *Pseudomonas aeruginosa* with 2 mg / ml and the lowest MIC on *Bacillus cereus* with 4 mg / ml. In comparison, zinc oxide nanoparticles, *Astragalus tragacantha* extract and zinc sulfate had the highest antimicrobial activity for zinc oxide nanoparticles, and their MIC had a significant difference in their effect on the tested bacteria ($p > 0.05$). Based on the results of this study, the synthesized nanoparticles of zinc oxide and aqueous extracts of *Astragalus tragacantha* and zinc sulfate have antibacterial properties, but the most antimicrobial effects were observed by zinc oxide nanoparticles.

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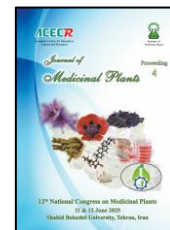
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Poster Presentation ID: 1541

Post Marketing Quality Control studies on flavonoid content of herbal products produced in the domestic pharmaceutical market and industries

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ARTICLE INFO	ABSTRACT
Keywords: PMQC Stability Flavonoids Formulation	In the system for monitoring the stability of the drug that is produced, its compounds and stability must be maintained; among the secondary metabolites of plants, flavonoids are an important group of compounds. Studies have proven the inverse relationship between flavonoid consumption and mortality from heart disease; flavonoids also have anti-inflammatory, anti-allergic, antiviral and anti-cancer properties[1,2]. In pharmaceutical laboratories, the amount of total flavonoids is examined by colorimetric method with a spectrophotometer. Simplicity, low cost, high speed make this method important. AlCl₃ identification is the most practical method at present. Investigating the stability of flavonoid compounds in natural products available in the PMQC market is of particular importance, and fortunately, the study was conducted in different cities with different climates, and many cases were passed and some were rejected. But there was a significant difference between the flavonoid content at the time of production and the time of analysis. These products are available in the form of tablets, capsules, powders, and liquid and dry extracts, based on their properties as antioxidants, anti-inflammatory, and in the prevention of chronic diseases and improving the general health of the body. Therefore, these studies are of great importance for promoting the herbal medicine production industry and the health level of the community, and the results of these studies will be considered for the design, synthesis, and formulation of new effective drugs.

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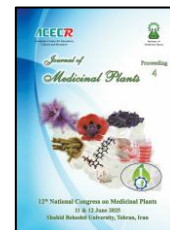
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Poster Presentation ID: 1542

Gamma radiation induced variation on Antioxidant enzymes Activity and rosmarinic acid accumulation in *Salvia leriifolia* Benth. (Lamiaceae)

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ARTICLE INFO

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ABSTRACT

Salvia leriifolia Benth. is one of the native Iranian medicinal plants which has been received attention in recent years due to its numerous therapeutic properties. The pharmaceutical properties of this species have been attributed to the presence of phenolic compounds, especially phenolic acids [1, 2]. This study investigates the enhancement of enzymes activity and rosmarinic acid (RA) accumulation through gamma irradiation in *Salvia leriifolia* callus cultures. The combination of 20 μ M NAA and 15 μ M BA was the best treatment for callus growth and proliferation. Proliferated calli were then exposed to different doses of gamma radiation (0, 10, 20, 40, 60, 80, and 100 Gy) from a Co60 source. After 60 days, antioxidant enzymes activity and RA content were evaluated. Gamma radiation exposure is known to increase the production of ROS, such as hydrogen peroxide (H_2O_2), superoxide (O_2^-), and hydroxyl radicals (OH^-), leading to OS in plant tissues. To mitigate this, plants activate antioxidant defense systems, including enzymes such as catalase (CAT), superoxide dismutase (SOD), ascorbate peroxidase (APX) and phenylalanine ammonia-lyase (PAL) [3]. Increased radiation intensity resulted in elevated antioxidant enzyme activity such as (CAT), (APX), (SOD), and (PAL), as well as increased accumulation of (RA). The highest enzyme activities, were recorded at 80 Gy (6.95 U/mg for PAL, 19.94 U/mg for SOD and 12.58 U/mg for APX) and RA accumulation reached 91.5 mg/g (DW), compared to 54.73 mg/g (DW) in the control group. A positive correlation was observed between increased antioxidant activity and PAL Activity, along with enhanced RA content, suggesting that phenolic compounds act as major antioxidants in response to gamma radiation. This study demonstrates that applying specific doses of gamma radiation can optimize cell lines for enhanced production of metabolic compounds, particularly phenolic acids, suggesting a promising strategy for improving secondary metabolite production in plant tissue cultures.

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Poster Presentation ID: 1543

Importance of seed mucilage on seed functions

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ABSTRACT

Myxospermy is a adaptive strategy of seed to different environments (Zhu et al, 2021). It is mucilage production from the epidermal cells of seed coat. Seed mucilage is a type of pectin polysaccharide that is produced in the golgi apparatus of the outer layer of cells in the seed coat and secreted into the cytoplasm or cell wall layer. It affects on seed germination phenology, soil seed bank dynamic, seed longevity and seed dispersal. Seed mucilage do all of them by controlling water and oxygen accessibility to the seed. Plants that have mucilage seeds grow mostly in desert areas. Mucilage affects seed dispersal and settlement mainly in four ways (Liu and Tan, 2007). a. Reducing the specific gravity of seeds in water. So that some smaller seeds could float on the water surface, they can spread a greater distance. b. After dispersal, the mucilage seeds become wet or absorb water and stick to the soil surface, which can prevent them from being transported by wind and rain from the vicinity of the mother plant to a distant environment that is not suitable for survival. c. Mucilage substances make the seeds larger and prevent them from being moved by wind and spreading further. d. When mucilage seeds are dispersed by wind and rain, they can stick to the stems and leaves of animals or other plants around them, or after being dispersed by hooks, thorns and other appendages, they can stick to other fruits and be spread further with the help of animals or wind. It is observed that mucilage materials have an important effect on the dispersion and settlement of mucilage seeds. This helps the seeds to disperse over long distances and increases the probability of finding new habitats. It also helps to settle the seeds near the mother plant to prevent them from being transported to a distant environment that is not conducive to survival by wind and rain.

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Antimetastatic Potential of *Polygonum bistorta* L. in HT-29 Colon Cancer Cells via Regulation of MMP-2 and MMP-9

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ARTICLE INFO	ABSTRACT
Keywords: <i>Polygonum bistorta</i> HT-29 colon cancer cells GC-MS MMP-2 MMP-9	<i>Polygonum</i> is a significant genus within the Polygonaceae family, comprising 35 species in Iran. Among them, <i>Polygonum bistorta</i> L. is a medicinal plant with promising therapeutic potential, particularly in the suppression of cancer cell metastasis. This study aimed to evaluate the effects of methanolic extracts from the leaves and rhizomes of <i>P. bistorta</i> L. on the expression of metastasis-related genes in HT-29 human colon cancer cells. Bioactive components within the extract were identified using Gas Chromatography-Mass Spectrometry (GC-MS), revealing compounds such as pyrocatechin, 1,2,3-benzenetriol, and β-tocopherol. These compounds are known to influence molecular pathways involved in tumor progression. To investigate the molecular basis of the anti-metastatic effect, total RNA was extracted from treated cells, followed by cDNA synthesis and quantitative Real-Time PCR to assess the expression levels of MMP-2 and MMP-9, two key genes involved in extracellular matrix degradation and tumor invasion. The results showed a significant downregulation of MMP-2 and MMP-9 expression, suggesting that <i>P. bistorta</i> L. may inhibit the metastatic potential of colon cancer cells. Overall, this study provides evidence for the role of <i>Polygonum bistorta</i> L. as a potential natural agent in modulating metastasis-related molecular pathways in colorectal cancer, offering a promising foundation for further development of plant-based anticancer therapeutics.

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The effect of bolus containing plant extracts on growth performance and health indicators of suckling lambs

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ARTICLE INFO	ABSTRACT
Keywords: Performance Health indicators Newborn lambs	This study was to investigate the effect of bolus containing plant extracts on growth performance and health indicators of suckling lambs. To conduct this study, 24 male newborn lambs of Zell breed mixed with Atabay, with an average weight of 5.5 ± 0.4 and an average age of 10 ± 0.3 days were used. The experimental treatments included Group 1-Control (without consuming bolus containing herbal extracts), 2-Treatment containing 1 gram bolus of herbal extract powder, 3-Treatment containing 2 gram bolus of herbal extract powder, and 4-Treatment containing 3 gram bolus of mixed herbal extract powder. The results of the growth performance showed that there were significant differences between the experimental treatments in final body weight, daily weight gain, daily milk consumption, and feed conversion ratio ($p < 0.05$). The results indicated that the treatments containing herbal extract powder had the highest final body weight, daily weight gain, daily milk consumption, and the lowest feed conversion ratio compared to the control group. The results of the health indicators showed that there were significant differences between the experimental treatments in fecal consistency score, the number of lambs affected by diarrhea, average days of diarrhea, <i>E. coli</i> population, and <i>Salmonella</i> in feces ($p < 0.05$). Based on the results of the present study, the addition of herbal extract for newborn lambs is recommended.

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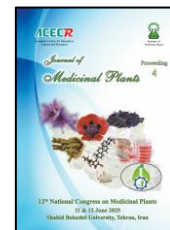
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Extraction from *Nepeta pogonosperma* using supercritical carbon dioxide

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ARTICLE INFO

Keywords:

Extraction
Essential oils
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Nepeta pogonosperma
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dioxide

ABSTRACT

Nepeta pogonosperma, member of the Labiatae family, is a plant uniquely found in Iran. This remarkable species is rich in secondary metabolites like flavonoids, phenols, and diterpenes, which contribute to its diverse benefits. These natural compounds are celebrated for their antioxidant, anti-inflammatory, analgesic, and neuroprotective properties. Because of their ability to impact various biological pathways, they've found a valuable place in traditional and modern medicine, showcasing the incredible potential of plants in promoting health. Carbon dioxide in the supercritical region has many applications in the separation of biological compounds. Among these characteristics are high diffusion coefficient, belonging to the category of green solvents, and the structure of compounds remaining unchanged in this process [1, 2]. Its low polarity has also made it a suitable tool for separating and extracting non-polar organic compounds such as alkanes and low-polarity compounds such as aldehydes and esters. Based on our knowledge, the extraction of the essential oil of this plant in supercritical fluid has not been yet reported. The supercritical carbon dioxide extraction of this plant has been compared with traditional method from chemical composition of point of view. Furthermore, the optimization of variables process has been implemented by Taguchi experimental design method [3, 4]. The results indicated that at lower temperatures, specifically within the range of 35 to 45 degrees Celsius and pressures between 180 to 250 bars, the best yields have been obtained.

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Poster Presentation ID: 1549

Synergistic Applications of Apitherapy, Phytotherapy, and Aromatherapy in Healthcare

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ARTICLE INFO

Keywords:

Apitherapy

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Aromatherapy

ABSTRACT

This article is about combining three complementary therapies, namely apitherapy, herbal medicine, and aromatherapy, to improve individual well-being. These therapies, when combined, can be effective in boosting the immune system, reducing pain and inflammation, and improving mental health. Apitherapy (the use of bee products such as honey and royal jelly, bee venom, propolis, beeswax, and pollen) with its immune-boosting, anti-inflammatory, and pain-relieving, antibacterial, antiviral, and strong antioxidant effects, along with phytotherapy (the use of herbs such as echinacea, licorice, turmeric, etc.) that have immune-modulating and anti-inflammatory effects, and aromatherapy (the use of essential oils such as lavender, peppermint, chamomile, etc.) that have analgesic and sedative properties, provide a complete and synergistic approach. These three areas can be effective in reducing inflammation, having antiseptic effects, strengthening the immune system and improving mental health. For example, honey and beeswax are anti-inflammatory, while herbs such as turmeric have strong anti-inflammatory compounds and essential oils such as lavender help reduce anxiety. This new combination, along with determining the correct dosage and biochemical interactions of the most active components, has very high potential. Overall, the experts at Maz Shomal Behesht Company have created a sustainable and comprehensive solution for health management with innovative methods.

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Green Synthesis of Nanoparticles Using Medicinal plant's Extracts and their Structural properties

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ARTICLE INFO	ABSTRACT
Keywords: Natural extracts Green synthesis Nanoparticles	There is increasing interest in environmentally friendly synthetic methods for nanoscale materials using natural extracts, due to their potential applications in various technologies and minimal environmental impact. This study focuses on synthesizing copper ferrite (CuFe₂O₄) nanoparticles through a green combustion method employing natural extract surfactants such as Cinnamon zeylanicum bark powder and Aloe vera leaf extract as fuel agents. For comparison, CuFe₂O₄ NPs are also synthesized using a polyvidone surfactant. The structural, morphological, optical, and magnetic properties of these nanoparticles are analyzed through various techniques. X-ray diffraction patterns reveal cubic and tetragonal crystal structures when using Aloe vera leaf and polyvidone surfactants, respectively. Field-emission scanning electron microscopy (FE-SEM) images show that the green-synthesized nanoparticles are significantly smaller than those prepared with the polyvidone surfactant. Despite this size difference, the band gap values of the nanoparticles remain comparable. Hysteresis loop measurements indicate an enhanced saturation magnetization ($M_s=39.63$ emu/g) and reduced coercivity ($H_c = 57$ Oe) for nanoparticles synthesized with Aloe vera, compared to $M_s=22.43$ emu/g and $H_c=1260$ Oe for those with polyvidone surfactants.

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Poster Presentation ID: 1551

Comparative Efficiency of Three Extraction Techniques in Recovering Key Phenolic Acids from *Ganoderma lucidum* Using LC-MS Analysis

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ARTICLE INFO

Keywords:

Ganoderma lucidum
Phenolic acids
Soxhlet extraction
Bioactive compounds
Extraction efficiency

ABSTRACT

The medicinal mushroom *Ganoderma lucidum*, widely recognized for its pharmacological properties such as antioxidant, anti-inflammatory, and immune-enhancing effects, has been extensively studied in both traditional medicine and modern research. Many of these therapeutic benefits are attributed to its phenolic compounds, including caffeic acid, chlorogenic acid, rosmarinic acid, and ferulic acid. This study aimed to compare the efficiency of three extraction methods—maceration, Soxhlet, and autoclave—on the yield of these bioactive compounds from *G. lucidum*. The experiment was conducted as a factorial trial under a completely randomized design in the laboratory of the Horticulture Department at Ferdowsi University of Mashhad. After grinding the mushrooms, extraction was performed using the three methods. Results demonstrated that the Soxhlet method significantly outperformed the others, yielding the highest concentrations of phenolic compounds. The levels of caffeic, chlorogenic, rosmarinic, and ferulic acids in Soxhlet extracts were markedly greater than those obtained via maceration or autoclave. Statistical analysis confirmed significant differences among the methods ($P < 0.01$). In conclusion, the choice of extraction method profoundly influences the efficiency of bioactive compound recovery, and selecting an optimal technique can enhance the quality of final products. Based on these findings, the Soxhlet method is recommended as the most effective approach for extracting phenolic compounds from *G. lucidum*.

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Poster Presentation ID: 1553

Eco-Friendly Botanical Extracts: The Effectiveness of *Rydingia persica* and *Myrtus communis* in Controlling *Trogoderma granarium*

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ARTICLE INFO	ABSTRACT
Keywords: Botanical insecticide Fumigant toxicity Lethal concentrations	The adverse effects of synthetic chemical pesticides on both human health and the environment have spurred a shift towards the use of natural and plant-derived insecticides for pest control. This research investigated the fumigant toxicity and repellent effects of methanolic extracts from <i>Myrtus communis</i> and <i>Rydingia persica</i> on both larvae and adult stages of the khapra beetle (<i>Trogoderma granarium</i>). The experiments were conducted under controlled conditions ($30 \pm 1^\circ\text{C}$, $60 \pm 5\%$ relative humidity, complete darkness) employing a completely randomized design. Mortality rates were measured at 24-, 48-, 72-, and 96-hours post-exposure. The LC_{50} values for <i>M. communis</i> extract were determined to be 11977, 3320.5, 1234.046, and 1225.372 $\mu\text{L/L}$ air, respectively. In contrast, the LC_{50} values for <i>R. persica</i> extract were found to be 10433, 29320, 3309, and 2616.907 $\mu\text{L/L}$ air. Repellency tests indicated RC_{50} values for <i>M. communis</i> extract at 5311.072 $\mu\text{L/L}$ for larvae and 1043.731 $\mu\text{L/L}$ for adults, whereas <i>R. persica</i> extract exhibited values of 8721.4 $\mu\text{L/L}$ for larvae and 3266.140 $\mu\text{L/L}$ for adults. The lower LC_{50} and RC_{50} values for <i>M. communis</i> indicate a higher level of insecticidal and repellent efficacy in comparison to <i>R. persica</i>. These findings suggest that methanolic extracts from <i>M. communis</i> and <i>R. persica</i> possess significant fumigant and repellent properties, highlighting their potential as botanical agents for managing <i>T. granarium</i> infestations in stored products.

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Larvicidal Potential of *Thymus vulgaris* Essential Oil Against House Fly (*Musca domestica*): An In Vitro Dose-Response Study"

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ARTICLE INFO	ABSTRACT
Keywords: Bio-pesticide Essential oils House fly larvae	Fly control is a challenging issue for industrial dairy farms during warm seasons. Chemical insecticides is a common method for controlling this insect which increases resistance to pesticides and gradually decrease their effectiveness. Fortunately, phytochemical compounds are a mixture of bio-active substances with different mode of action that prevent the development of insecticide resistance. <i>Thymus vulgaris</i> is one of plants that its larvicidal effect has been reported for mosquito (1) and house fly (2,3). Since the active compounds in thymus are affected by various environmental factors, in vitro tests seems necessary to find its lethal dose. In order to find a phytochemical compound that combat house fly larvae, Essential oil of <i>Thymus vulgaris</i> was studied. The EO prepared in seven different dilutions with 60% ethanol (0, 0.5, 1, 1.5, 2, 2.5, 3%) and 3rd-instar housefly larvae were used with five replicates and 25 larvae per replicate for each concentration. Larvicidal assay was carried out with dipping method for 60s then treated larvae transferred to plastic containers containing a mixture of alfalfa, wheat bran, milk powder and yeast. LC₅₀ and LC₉₀ were calculated using probit regression by SPSS software and were 2.1 and 3.2 %, respectively. GC-MS analysis of EO identified thymol, longifolene and ortho-Cymene as the major compounds, with 41.2%, 16.4% and 6.6 % concentrations, respectively. The treated larvae which survived after 24 hours, kept until emerging flies appeared and then flies were enumerated and weighed. Control (23± 0.5) had the highest, whereas 3 and 2.5% EO-dipped treatments showed the lowest number of survived fly (5± 1.1). Average of fly weight was 65.5 and 12.5 for control and 3% treatment. In conclusion, data showed <i>Thymus vulgaris</i> had larvicidal effect against fly larvae but for using it in bio-pesticide formulation the best chemotype of it should be found.

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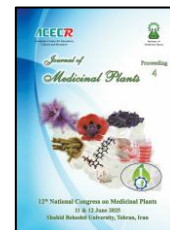
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Poster Presentation ID: 1555

Green Extraction of Bioactive Compounds from *Glycyrrhiza glabra* Root Using Choline Chloride–Ethanol: Optimization via Response Surface Methodology

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ARTICLE INFO	ABSTRACT
Keywords: <i>Glycyrrhiza glabra</i> Green solvent Choline chloride-ethanol RSM Antioxidant activity	The extraction of bioactive compounds using green solvents has gained significant attention due to environmental concerns and the need for safer products in pharmaceutical and food industries. Green solvents can enhance extraction efficiency and selectivity, especially when combined with advanced techniques like ultrasound extraction. Their use minimizes harmful residues, enabling direct application in food and pharmaceutical products without posing health risks [1, 2]. In this study, licorice root (<i>Glycyrrhiza glabra</i>) was used as the source of bioactive compounds, and a deep eutectic solvent composed of choline chloride and ethanol was employed as a green extraction medium. Key response variables including glycyrrhizic acid derivatives, total phenolic content (TPC), total flavonoid content (TFC), and antioxidant activities (DPPH and FRAP) were evaluated under varying extraction conditions. A Central Composite Design (CCD) integrated with Response Surface Methodology (RSM) was applied to optimize three independent variables: temperature (35–80°C), time (20–60 min), and solvent concentration (30–80%). The optimized extraction conditions were determined as 80°C, 59.24 minutes, and 80% solvent concentration. Under these conditions, the extract yielded 180.20 µg/g of glycyrrhizic acid, 57.20 mg GAE/g of total phenolics, 8.64 mg QE/g of total flavonoids, 62.99% DPPH radical scavenging activity, and 1077.16 µmol Fe²⁺/g FRAP antioxidant capacity. The overall desirability score for the optimized model was 0.892, indicating high predictive accuracy. These results demonstrate the efficiency and sustainability of choline chloride–ethanol as a green solvent system for extracting multifunctional phytochemicals from licorice root. The extract's high antioxidant potential further supports its application in the development of natural health products and functional foods.

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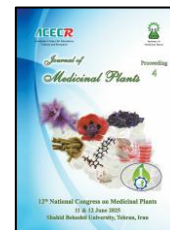
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Poster Presentation ID: 1560

Study of indigenous knowledge with emphasis on medicinal plants in Mount Qaroun, Khuzestan Province

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ARTICLE INFO

Keywords:

Indigenous knowledge
Medicinal plants
Mount Qaroun
Khuzestan

ABSTRACT

Indigenous knowledge is the knowledge of innovations and methods of indigenous and local communities around the world, which has been prepared and compiled through experience over many centuries and adapted to the local culture and environment. Recognizing, revitalizing, and adapting indigenous knowledge to the needs of today's human societies provides the basis for proper access to resources (water, forests, land, etc.). The knowledge of villagers, rangers, farmers, livestock keepers, etc. complements modern scientific knowledge in terms of content and subject matter. The diversity of medicinal plant cover in the country has caused natives of different regions of the country to benefit from them to treat many patients, and for this reason, Iran is one of the leading countries in indigenous knowledge. The present study aimed to identify and document the culture of traditional use of medicinal plants in Mount Qaroun of Dezpart county, Khuzestan province. This study was based on field surveys, information from indigenous people, and research on documents and beliefs in this area. Plant species were collected from different areas based on the introduction of indigenous villagers, especially experienced, elderly, and knowledgeable people. After identifying the plants of the region, local names, medicinal properties, methods of use, and other information related to the species were simultaneously collected. In this study, 104 species are used medicinally and orally by the indigenous people of the region and are used in the treatment of colds, headaches, digestive disorders, respiratory problems, diabetes, fever, seizures, strengthening teeth and gums, skin diseases, rheumatism, abortion, kidney stones, and spices. Considering the diversity of medicinal plants in this region and the widespread use of them by indigenous people to treat many diseases, further studies can be done to preserve endangered plant species and educate local people to properly collect plant species and develop appropriate harvesting, cultivation, and restoration methods, in order to protect natural resources and improve the livelihoods of local communities.

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Impact of γ -aminobutyric acid (GABA) on phytochemical composition and antioxidant activity in the medicinal plant *Calendula officinalis* L

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ARTICLE INFO	ABSTRACT
Keywords: GABA Pot marigold Asteraceae Phytochemical	<i>Calendula officinalis</i> L. (family Asteraceae), commonly known as pot marigold or English marigold, is a medicinal plant rich in bioactive compounds. Phytochemical analyses have identified several key constituent groups, including triterpenoids, flavonoids, coumarins, quinones, volatile oils, carotenoids, and amino acids, which contribute to its therapeutic properties. Gamma-aminobutyric acid (GABA) is a non-protein signaling compound in plants that plays a crucial role in stress responses, growth regulation, and secondary metabolite biosynthesis. Recent studies suggest that exogenous GABA application can enhance the production of bioactive compounds in medicinal plants by modulating key enzymatic pathways and gene expression related to secondary metabolism. In this study, the effects of different levels of GABA (0, 5, 10, 20 and 40 mM) were investigated as a experiment based on completely randomized design with three replications under hydroponic culture conditions on phytochemical and antioxidant parameters of <i>C. officinalis</i> L. Analysis of variance revealed significant effects ($p < 0.05$) of GABA concentrations on phytochemical and antioxidant properties. Mean comparisons demonstrated that 20 mM GABA treatment yielded: highest total phenolics (54.33 mg GAE/g DW), flavonoid content (7.29 mg QUE/g DW) and antioxidant capacity (58.06 %). Control treatment showed minimal values for all parameters. These findings suggests GABA's potential as a sustainable biostimulant to improve the medicinal quality of marigold extracts for pharmaceutical and nutraceutical applications.

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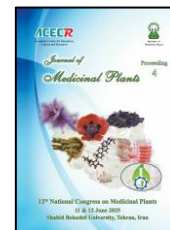
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Poster Presentation ID: 1562

Phenotypical Diversity of Nine *Froriepia subpinnata* (Apiaceae) Populations in Northern Iran

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ARTICLE INFO

Keywords:

Morphological
Food
Domestication
Diversity

ABSTRACT

Froriepia subpinnata is a biennial medicinal and aromatic plant belonging to Apiaceae. *F. subpinnata* leaves are used in people's diet [1]. Previous studies have stated many physio-biological activities such as antiviral, immunomodulatory, anti-inflammatory, antiproliferative, and antioxidant activity for various species of *Froriepia* [2]. In this study, agro-morphological variability among nine Iranian populations of the plant was studied to find adequate samples for further use in breeding and exploitation programs. For this purpose, nine populations from Mazandaran and Guilan provinces were collected and morphological traits were evaluated. The highest coefficient of variation was obtained in plant height (88.19%) and leaf width (50.05%). The range of morphological attributes analyzed was for plant height (1-62 cm), leaf length (0.31-3.20 cm), and leaf width (0.30-2.90 cm). The highest and lowest plant height, leaf length and leaf width were observed in ASP6 and ASP9 populations, respectively. In general, populations of ASP6, ASP1, and ASP5 are distinguished as promising candidates for further exploitation in breeding and production programs aimed at improving both agricultural productivity and pharmaceutical applications, as well as exploring innovative applications in food safety.

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Poster Presentation ID: 1564

The effect of climatic layers on localization of rosemary cultivation sites

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ARTICLE INFO

Keywords:

Kriging
Rosemary
Layers
Mechanism
Temperature

ABSTRACT

The increasing demand for medicinal plants and identifying areas susceptible to their growth with an efficient method and minimal field costs are the issues being emphasized in the agricultural sector. The aim of this study is to investigate the effect of climatic layers on the localization of rosemary (*Rosmarinus officinalis* L.) cultivation in East Azerbaijan Province using spatial analysis (kriging). The data layers in Arc GIS software include average temperature, relative humidity, and precipitation from 17 synoptic stations over a period of time (1394-1402). After preparing temperature, relative humidity, and precipitation maps using kriging, three combinations were used to overlay the produced maps (overlay 1: 70% temperate, 20% relative humidity, 10% precipitation- overlay 2: 20% temperate, 70% relative humidity, 10% precipitation- overlay 3: 20% temperate, 10% relative humidity, 70% precipitation). The produced maps by kriging, were reclassified based on the suitable state of climatic conditions for rosemary growth. In the first overlaying, Osku, Azarshahr, Ajab Shir, Bonab, parts of Malekan, Maragheh, Jolfa, Marand, Shabestar, Tabriz and Miyaneh were in an optimal state of cultivation. The second case was similar to the first case, except that the areas related to Tabriz, Marand, and Miyaneh were added, and parts of Ahar, which was not previously in susceptible areas, were added. The third overlaying, was completely different from the previous overlaying, and suitable areas included parts of Horand, Kalibar, and Khodaafrin. The climatic conditions of each region have a significant impact on the germination mechanism and growth of rosemary, and determining potential areas with spatial analysis can be of great help in this regard.

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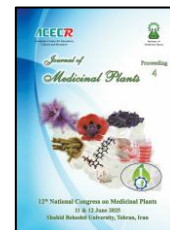
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Poster Presentation ID: 1565

Synergistic Effects of Vermicompost and Biofertilizers on Photosynthesis and Grain Yield of Safflower (*Carthamus tinctorius* L.)

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ARTICLE INFO

Keywords:

Arbuscular Mycorrhiza

Biofertilizer

Carthamus tinctorius

Grain yield

Total chlorophyll

ABSTRACT

To investigate the effects of vermicompost and biofertilizers *Glomus mosseae* and Phosphate Barvar-2 on some quantitative and qualitative traits of safflower (*Carthamus tinctorius* L.), a factorial experiment was conducted based on a randomized complete block design (RCBD) with three replications at the research farm of Yasouj University. The experimental treatments included vermicompost at three levels (0, 5, and 10 t/ha) and biofertilizers at four levels (control, *G. mosseae* at 80 kg/ha, Phosphate Barvar-2 at 100 g/ha, and the combined application of *G. mosseae* + Phosphate Barvar-2). Results showed that the application of 10 t/ha vermicompost resulted in the highest seed nitrogen content (2.94%), representing a 30.66% increase compared to the control. Leaf chlorophyll content increased by 31% and 43% with 5 and 10 t/ha of vermicompost, respectively. The combined application of biofertilizers further enhanced chlorophyll content by 10%. Plant height increased by 16% and 27% with 5 and 10 t/ha of vermicompost, respectively, compared to the control, while the combined biofertilizer treatment increased plant height by 15%. The highest grain yield (mean of 2,578 kg/ha) was obtained from the treatment receiving 10 t/ha of vermicompost along with the combined biofertilizers. The co-application of *G. mosseae* + Phosphate Barvar-2 under 5 and 10 t/ha vermicompost resulted in a 36% and 35% increase in safflower grain yield, respectively. Vermicompost improved the soil environment, facilitating bacterial proliferation and fungal activity [1]. Consequently, the synergistic effects of these biological resources enhanced the availability, uptake, and translocation of macronutrients such as nitrogen to aerial parts and seeds, improving photosynthetic efficiency [2]. These physiological improvements led to enhanced reproductive growth and higher grain yield. Therefore, the combined application of 10 t/ha vermicompost with *G. mosseae* and Phosphate Barvar-2 not only achieved optimal safflower grain yield but also reduced the need for excessive chemical fertilizer usage.

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Poster Presentation ID: 1566

Effect of drought stress and mycorrhizal fungi on some physiological traits of *Zataria multiflora* Boiss.

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ARTICLE INFO	ABSTRACT
Keywords: Drought stress Mycorrhizal fungi Physiological traits Antioxidant enzymes <i>Zataria multiflora</i>	Drought stress is one of the most important environmental stresses, reduces water absorption, stomatal conductance, transpiration, photosynthesis, and disrupts the hormonal balance of the plant. Mycorrhizal fungi increase the root absorption level and affect tissue water uptake and leaf physiology by changing the speed of water movement in host plants. This experiment was conducted in split plots in a randomized complete block design with 3 replications at the Faculty of Agriculture, Lorestan University, in 2023-2024. The main factor included complete irrigation (control), interruption of irrigation at the stem stage, interruption of irrigation at the budding stage and interruption of irrigation at the 50% flowering. The secondary factor included no use of biofertilizer (control), inoculation with <i>Glomus intraradices</i>, inoculation with <i>Glomus mosseae</i> and inoculation with <i>Glomus mosseae</i> + <i>Glomus intraradices</i>. Biofertilizers contained mycorrhizal fungi named <i>Glomus intraradices</i> and <i>Glomus mosseae</i> as active fungal organs (including spores, hyphae and roots). The results showed that there was a significant difference between the two years in the traits of peroxidase, chlorophyll b, proline, total phenol at the 1% probability level and catalase, superoxide dismutase and malondialdehyde at the 5% probability level. Comparison of the mean traits showed that catalase, superoxide dismutase, chlorophyll b, proline, total phenol, essential oil percentage and essential oil yield were higher in the second year. Comparison of the mean stress showed that the highest flowering shoot yield was also in the full irrigation treatments and moisture stress applied at the full flowering stage. Examination of the essential oil percentage showed that its highest value with 57.25% was in the stress treatment at the budding stage in inoculation with <i>G. mosseae</i>. It was observed that the highest essential oil yield with 25.61 kg/ha was obtained from the full irrigation treatment in inoculation with <i>G. intraradices</i>.

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Poster Presentation ID: 1568

Effect of organic fertilizers on morphophysiological traits of peppermint (*Mentha piperita* L.) under water deficit stress

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ARTICLE INFO

Keywords:

Deficit stress

Organic fertilizers

Morphophysiological
traits

Mentha piperita

ABSTRACT

To investigate the response of some quantitative and qualitative traits of peppermint (*Mentha piperita* L.) to organic fertilizers under water deficit stress, a factorial experiment was conducted in a randomized complete block design in the research farm of the Faculty of Agriculture, Lorestan University, in three replications in 2023. The experimental treatments included organic fertilizer at five levels (control, cow manure (16 tons/ha), chicken manure (8 tons/ha), vermicomposting (8 tons/ha), and compost (16 tons/ha)) and soil moisture at three levels (50 (severe stress), 70 (mild stress), and 90 (control: no stress) percent of field capacity moisture). Water deficit stress reduced leaf phosphorus and potassium content, leaf phenolic and flavonoid compounds, and leaf relative moisture content, and increased leaf essential oil yield at the full flowering stage. The highest amount of essential oil (1.71%) was observed under mild stress conditions. Chicken manure and vermicomposting had a significant effect on increasing leaf nitrogen, protein, and DPPH radical scavenging percentage under water deficit stress conditions compared to non-stress conditions. The maximum yield of essential oil (35.43 kg/ha), stem dry weight (901.35 kg/ha), leaf dry weight (1116.21 kg/ha), and shoot dry weight (1965.58 kg/ha) was obtained in chicken manure treatment under optimal irrigation conditions. Therefore, in order to increase plant yield, the use of organic fertilizers under water deficit stress conditions is recommended in order to achieve sustainable agriculture.

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Poster Presentation ID: 1569

Morphophysiological response of the medicinal plant peppermint (*Mentha piperita* L.) to saline water irrigation and application of bovine biofertilizer

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ARTICLE INFO

Keywords:

Saline water

Biofertilizer

Morphophysiological
response

Biomass

Mentha piperita

ABSTRACT

Peppermint is a medicinal plant grown worldwide, but it has not been extensively studied, especially the use of saline water for its cultivation. In this sense, the objective of this study is to evaluate the effect of saline waters on peppermint cultivation under the application of bovine biofertilizer. The experiment was carried out in a greenhouse of the Faculty of Agriculture, Lorestan University in 2023. The experimental design was completely randomized, in a factorial scheme of 5×2 , with 8 replicates. The treatments consisted of electric conductivity combined with irrigation water (ECw) of 1.0, 2.0, 3.0, 4.0, and 5.0 dS/m in the presence and absence of bovine biofertilizer. The increase in electrical conductivity of the irrigation water levels from 1 dS/m reduced the growth, development and production of peppermint biomass. Peppermint plants that received bovine biofertilizer had superior results in growth and biomass production. The application of bovine biofertilizer attenuates the effects of salty peppermint. The growth and production of peppermint biomass increased when the plants are irrigated with low salinity water (1 dS/m) using bovine biofertilizer.

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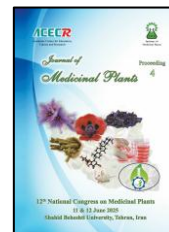
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Poster Presentation ID: 1570

Phytochemical Profiling and Antioxidant Variability in Wild Populations of Gazangabin (*Astragalus brachycalyx* Fisch.) Across Western Isfahan, Iran

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Keywords:

Astragalus brachycalyx

Diversity

Flavonoid

Manna

Total Phenol

This study investigates the phytochemical profiling and antioxidant variability in wild populations of *Astragalus brachycalyx* Fisch. (Gazangabin), a medicinally important Iranian species producing fructose-rich manna via psyllid insect activity. Samples from six locations in western Isfahan (Golestankouh, Daran, Isfahanak Olia/Abdol, Choghyourt, First Meydanak) were analyzed to evaluate spatial variation in bioactive compounds. Aerial parts of three individuals per site (n=18) underwent ultrasonic-assisted methanolic extraction, followed by spectrophotometric quantification of total phenolic (TPC, gallic acid equivalent) and flavonoid (TFC, rutin equivalent) contents, alongside FRAP assay for antioxidant activity. Results demonstrated notable intersite differences: TPC ranged from 17.93 (Isfahanak Olia) to 28.29 mg/g DW (Isfahanak Abdol), while TFC varied 10-fold (11.75 mg/g DW in Isfahanak Abdol to 115.5 mg/g DW in Choghyourt). Antioxidant capacity peaked in Daran (0.9 mM Fe²⁺/g DW) and was lowest in Isfahanak Olia (0.5 mM Fe²⁺/g DW). Despite these trends, statistical analysis (SAS) revealed no significant population-level divergence (p>0.05), implying environmental or genetic uniformity across the region. The findings suggest that *A. brachycalyx* maintains relatively stable phytochemical traits in western Isfahan, supporting its reliability as a source of natural antioxidants and traditional therapeutics. This study provides the first comparative phytochemical baseline for Gazangabin populations in this region, highlighting its potential for standardized applications in nutraceuticals and ethnomedicine, though further research is needed to elucidate underlying consistency mechanisms.

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Impact of foliar application of nano-selenium on pot marigold morphological traits under drought stress

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ARTICLE INFO	ABSTRACT
Keywords: <i>Calendula officinalis</i> Ornamental crop Selenium nanoparticle	Pot marigold (<i>Calendula officinalis</i> L.) is an annual or biennial plant with Mediterranean origin. It is cultivated as a cut flower and pot plant and is a valuable ornamental and medicinal plant with quick flowering, long flowering period and anti-inflammatory and regenerative bioactive compounds. Drought refers to a time of no appreciable precipitation; Selenium (Se) as a chemical, non-metal, and rare element, at low concentrations has positive impacts on growth, antioxidant capacity enhancement, and improving the absorption of other elements in herbaceous plants under stress conditions. We examined the role of nano-selenium (0, 2, 4, and 6 mg/L) on growth attributes (plant height, stem diameter, number of leaves and flower color index (a*, b*, L*, C, H)) under drought stress (100, 70, and 40 % of field capacity (FC)) conditions in a complete randomized design with three replications. Maximum plant height was recorded in the 2 mM nano-selenium treatments at both 100% and 70% of FC, while the maximum stem diameter was recorded in the 4 mM nano-selenium treatment at 40% of FC. Furthermore, the maximum number of leaves was recorded in the 6 mM nano-selenium treatment at a 40% of FC. Drought stress increased flower color index, particularly chroma, and 4 mM nano-selenium treatment combined with drought stress also boosted these indices. Flower color index and plant height, were improved with low levels of selenium nanoparticles, both in the control treatment and at 70% field capacity. Selenium nanoparticles improved the growth characteristics of plants by mitigating the adverse impacts of drought stress.

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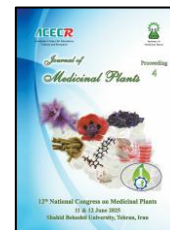
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Poster Presentation ID: 1572

A Comparative Evaluation of Microscopic and Macroscopic Parameters in Full-Thickness Skin Wound Healing: Phycocyanin Ointment Versus Phenytoin Ointment in Rats

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ARTICLE INFO

Keywords:

Full-thickness
Wound
Wound healing
Phycocyanin
Phenytoin

ABSTRACT

This study investigated the effects of phycocyanin extracted from *Spirulina platensis* and the drug phenytoin on the healing of full-thickness skin wounds in a female Syrian rat model. Given the antioxidant and antibacterial properties of phycocyanin and the established role of phenytoin in promoting full-thickness wound healing, the aim was to compare the efficacy of these two agents in facilitating tissue repair. 40 rats were randomly assigned into three treatment groups. Standardized full-thickness excisional wounds were created on the dorsal area of each rat. Treatments included phycocyanin ointment, phenytoin ointment, and a control group with no active treatment. The wound healing process was monitored clinically, as well as through macroscopic and histopathological assessments on days 4, 7, and 14. Histological evaluation was performed using the Abramov Wound Healing Scale, which assesses parameters such as inflammation, fibroblast proliferation, neovascularization, and re-epithelialization. Statistical analyses were carried out using the Two-Way ANOVA framework for normality, Levene's test for homogeneity of variances, and the Kruskal–Wallis test followed by Mann–Whitney U tests to evaluate intergroup differences. A significance level of $P < 0.05$ was considered. Throughout the study, the animals remained healthy, showing no unusual changes in weight or behavior—a reassuring sign. Visibly, wounds treated with phycocyanin and phenytoin shrank more quickly than untreated wounds, with phycocyanin leading the way. Under the microscope, phycocyanin-treated wounds showed richer collagen layers, more active fibroblasts, and healthier new blood vessels, painting a clear picture of stronger, faster regeneration. Our findings suggest that phycocyanin from *Spirulina platensis* is not only effective but may even surpass traditional treatments like phenytoin in some healing aspects. This natural compound holds exciting promise as a gentle yet powerful aid in wound care. Future research could unlock its full potential, possibly bringing its healing touch to human medicine.

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Poster Presentation ID: 1573

Comparison of Phenolic compounds and Antioxidant capacity of Seeds, Sprouts and Microgreens of the Bitter vetch (*Vicia ervilia*)

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ARTICLE INFO	ABSTRACT
Keywords: <i>Vicia ervilia</i> Phenolic compounds Antioxidant activity Microgreens Sprouts	Bitter vetch <i>Vicia ervilia</i> is recognized as a rich source of phenolic compounds and natural antioxidants, holding significant value in nutrition and traditional medicine. This study investigated and compared the total phenolic content and antioxidant activity at three growth stages of bitter vetch including seed, sprout, and microgreen. The results showed that microgreens had the highest concentration of phenolic compounds and the greatest antioxidant activity, as determined by Folin-Ciocaltu and DPPH scavenging activity respectively. While sprouts exhibited a notable increase in these parameters compared to seeds, their levels were still lower than those of microgreens. This increase in microgreens is likely due to the activation of phenolic biosynthetic pathways during the leaf growth stage. The findings suggest that bitter vetch microgreens can serve as a rich source of bioactive compounds with high antioxidant activity which might be effective for ameliorate of oxidative stress. This study emphasizes the importance of utilizing advanced plant growth stages to better harness the medicinal and nutritional properties of bitter vetch.

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Poster Presentation ID: 1579

Ethnobotanical Significance and Culinary Use of *Froriepia subpinnata* (Apiaceae) Among Ethnic Groups in Northern Iran

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ARTICLE INFO	ABSTRACT
Keywords: Anarijeh Aromatic plant Food Natural habitat Traditional use	<i>Froriepia subpinnata</i>, locally known as <i>Gijavash</i>, is a biennial plant belonging to the Apiaceae family that grows naturally in the northern Iranian provinces of Guilan, Mazandaran, and Golestan. Due to its aromatic leaves and unique flavor, it is widely used in local cuisines. Despite its extensive traditional use, there is limited written ethnobotanical documentation on this species [1]. The aim of this study is to document the traditional culinary applications of <i>F. subpinnata</i> among various ethnic groups in northern Iran and to explore the cultural diversity reflected in its local names and methods of preparation. Ethnobotanical data were collected and analyzed through structured interviews with local residents in the mentioned provinces. More than 30 distinct local names were recorded for <i>Gijavash</i>, including <i>Anarijeh</i>, <i>Sinousi</i>, <i>Chinabarg</i>, and <i>Kinjavash</i>, highlighting its broad cultural relevance. The plant is commonly used in traditional dishes such as <i>Sabzi Polo</i> (herbed rice), <i>Kuku Sabzi</i> (herb frittata), <i>Morgh-e-Torsh</i> (sour chicken stew), stuffed fish, and various types of herb soups locally named <i>Ash</i>. It is also added as a seasoning to yogurt, salads, and egg-based dishes such as <i>Nargesi</i>. A local belief attributes the plant's high iron content to the dark discoloration of hands when chopping it. <i>F. subpinnata</i> plays a vital role in the culinary heritage of northern Iran [2]. Its rich cultural diversity and notable nutritional value underscore the need for its conservation and further ethnobotanical research. Given its culinary significance and cultural richness, <i>F. subpinnata</i> holds strong potential for integration into regional agrotourism, sustainable agriculture, and functional food product development.

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Poster Presentation ID: 1580

Effects of γ -Aminobutyric Acid on Phytochemical Contents of *Catharanthus roseus* (L.)

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ARTICLE INFO	ABSTRACT
Keywords: Antioxidant activity GABA Indole alkaloids	<i>Catharanthus roseus</i> (L.) G. Don (Madagascar periwinkle) is a tropical/subtropical plant belonging to the family Apocynaceae. Its medicinal properties are attributed to the presence of a wide array of bioactive compounds, especially terpenoid indole alkaloids and polyphenolic compounds and have been reported to have multiple biological effects, including anticancer, antibacterial, antifungal, antioxidant [1, 2]. In this study, a pot experiment was used in order to evaluate the effects of foliar application γ-aminobutyric acid (GABA) on total alkaloids content in leaves and total phenol and flavonoids and antioxidant activity in different organs (flowers, leaves and roots) of <i>C. roseus</i>, var: Red Really based on factorial completely randomized design (FCRD) in 4 different concentrations (0, 5, 10 and 20 mM) GABA, with three replications. The results obtained showed that total alkaloids contents were significantly increased ($p < 0.01$) by application of 20 mM GABA concentration in Red Really. The highest content of total alkaloids (325 $\mu\text{g/g}$ DW) was recorded in concentration of 20 mM GABA. Also, the lowest content (158.33 $\mu\text{g/g}$ DW) was recorded in the control sample. The results obtained showed that total phenol and flavonoid contents were significantly increased ($p < 0.01$) by 10 mM GABA concentration. The highest content of total phenol and flavonoids (42.63 mg/g FW and 21.53 mg/g FW respectively) were recorded in the leaf organ and concentration of 10 mM. Also, the lowest content of phenols (18.27 mg/g FW) and flavonoids (7.65 mg/g FW) were obtained in the root organ and control samples. The considerable variations in the antioxidant activity of different organs were demonstrated by different treatments. The highest amount of antioxidant activity was obtained in the flower organ and concentration of 10 mM and the lowest content was obtained in the leaf organ and control samples.

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Poster Presentation ID: 1582

Semi-synthesis of new derivatives of codeine compound using γ -aminobutyric acid as linker

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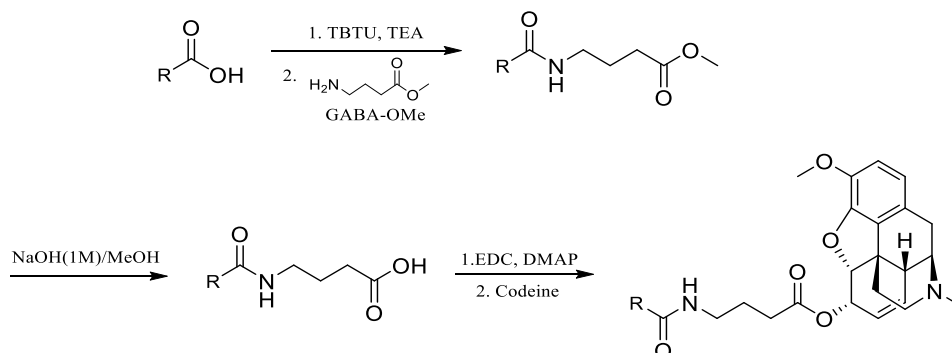
ARTICLE INFO

Keywords:

Opioid
compounds
Codeine
GABA
Analgesic
Coupling reaction

ABSTRACT

Codeine, a prevalent opioid alkaloid derived from the opium poppy (*Papaver somniferum*), functions primarily as a μ -opioid receptor agonist, exerting analgesic effects. This project aimed to modify the 6-position of codeine to develop novel compounds with improved analgesic properties by utilizing GABA (γ -aminobutyric acid) as a linker. Initially, the carboxylic acid group of GABA was protected with a methyl ester group, and then by employing coupling reagents, GABA was conjugated from its free amino group to acidic compounds. Subsequently, after deprotection and hydrolysis of the methyl ester group, the resulting product was coupled to the 6-position of codeine via an esterification reaction.



Also, molecular docking studies were used to investigate the tendency of the synthesized derivatives to bind to the active site of the analgesic μ -receptor. This study was carried out in morphinan agonist BU72 active site of the MOR (PDB ID: 5C1M) using Glide application in Maestro 10.2 platform (Schrödinger) [1].

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Poster Presentation ID: 1583

Synthesis of Novel Amide Derivatives of Noscapine Utilizing a GABA Linker and Evaluation of Their Cytotoxic Properties

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ARTICLE INFO

Keywords:

Noscapine

Cancer

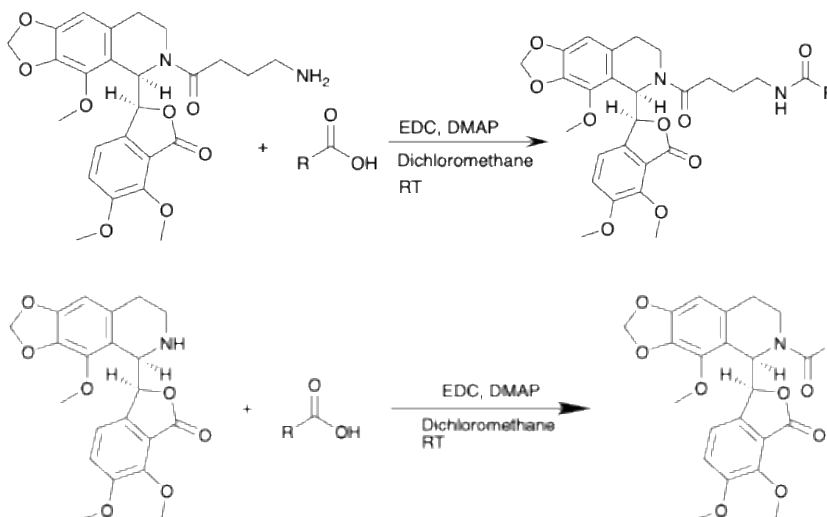
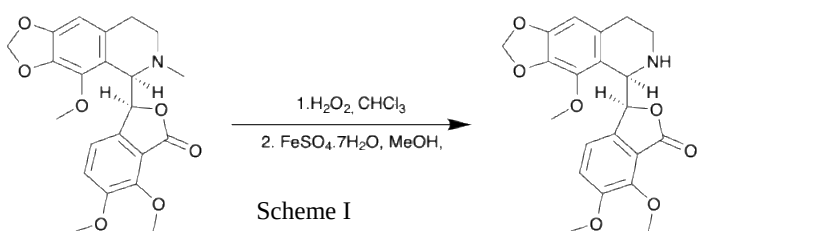
GABA

Amide bond

γ -Aminobutyric acid

ABSTRACT

In this study, the semi-synthesis of novel amide derivatives of noscapine was carried out. Initially, *N*-nornoscapine was synthesized via the *N*-demethylation reaction of noscapine (Scheme I). Subsequently, two series of derivatives were synthesized through a coupling reaction and amide bond formation, utilizing *N*-nornoscapine as the secondary amine. In the first series, γ -aminobutyric acid (GABA) was employed as a linker, resulting in the synthesis of ten novel derivatives. The second series comprised ten derivatives synthesized using the same acids, with the key difference of lacking the GABA linker (Scheme II).



The cytotoxicity of the synthesized compounds was evaluated on MCF-7 breast cancer cell line.

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Poster Presentation ID: 1585

A Whole-Genome Perspective on Diversity, Structure, and Domestication of Iranian Olive (*Olea europaea* L.)

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ARTICLE INFO	ABSTRACT
Keywords: <i>Olea europaea</i> Iranian olive Population genomics Structural variation domestication Genetic diversity Whole-genome sequencing Demographic inference	The olive tree (<i>Olea europaea</i> L.), a cornerstone of Mediterranean agriculture and culture, exhibits a rich tapestry of genetic diversity shaped by millennia of domestication and environmental adaptation. While the genomics of Mediterranean cultivars have been extensively studied, the eastern regions, particularly Iran, remain underexplored. Here, we present the most comprehensive whole-genome sequencing effort to date on Iranian olive germplasm, encompassing 102 genotypes from across the country. Using high-coverage genome resequencing, we detected over 35 million variants, revealing a high level of nucleotide diversity ($\pi = 0.0092$) and extensive structural variation, with 28,734 deletions uniquely identified in Iranian accessions. Comparative analyses with 112 Mediterranean cultivars underscored the distinct genetic identity of Iranian olives, supported by PCA, phylogenetic trees, and structure analysis. Demographic analysis suggests a complex history of divergence and gene flow, positioning the Levant and Iran as pivotal regions in the olive's domestication and dispersal. Our findings reinforce the hypothesis that Iran represents a secondary center of olive diversity and evolution, with implications for conservation and breeding strategies in the face of climate change and growing global demand.

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2. Machine learning-aided microRNA discovery for olive oil quality Mohamad Hossein Pakdel, Ali Akbar Asadi, Elahe Tavakol, Vahid Shariati, Mehdi Hosseini Mazinani.
3. Meta-analysis of transcriptome reveals key genes relating to oil quality in olive AliAkbar Asadi, Vahid Shariati, Soraya Mousavi, Roberto Mariotti & Mehdi Hosseini Mazinani.



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Poster Presentation ID: 1586

Unveiling specific genetic pathways for olive oil quality: a combined meta-analysis and comparative transcriptomic approach

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ARTICLE INFO	ABSTRACT
Keywords: Olive RNA-seq Meta-analysis Oil quality	Olive oil contains monounsaturated oleic acid up to 83% and phenolic compounds, making it an excellent source of fat. Due to its economic importance, the quantity and quality of olive oil should be improved in parallel with international standards. In this study, we analyzed the raw RNA-seq data with a meta-analysis approach to identify important genes and their metabolic pathways involved in olive oil quality. Also, in this study, the genetic basis of oil quality were investigated by comparing the transcriptome of two Iranian cultivars with contrasting oil profiles. The key genes were investigated in the metabolic pathways and were grouped into four classes based on the biosynthetic cycle of fatty acids and factors that affect oil quality. Galactose metabolism, glycolysis pathway, pyruvate metabolism, fatty acid biosynthesis, glycerolipid metabolism, and terpenoid backbone biosynthesis were the main pathways in olive oil quality. In the minor compound, the terpenoid backbone biosynthesis was investigated and important enzymes were identified as an interconnected network that produces important precursors for the synthesis of a monoterpene, diterpene, triterpene, tetraterpene, and sesquiterpene biosynthesis. Using RNA sequencing at Jaén index four, we analyzed genes involved in fatty acid biosynthesis. Differential expression analysis identified 2775 genes showing statistically significant differences between the cultivars. Investigating these genes across nine fundamental pathways involved in oil quality led to the identification of 25 effective genes. This research provides a comprehensive understanding of the genetic and molecular mechanisms underlying oil quality in olive cultivars. The findings have practical implications for olive breeders and producers, potentially streamlining cultivar selection processes and contributing to the production of high-quality olive oil.

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2. Machine learning-aided microRNA discovery for olive oil quality Mohamad Hossein Pakdel, Ali Akbar Asadi, Elahe Tavakol, Vahid Shariati, Mehdi Hosseini Mazinani.
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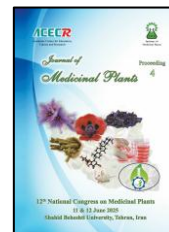
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Poster Presentation ID: 1588

Impact of Production Systems on Phytochemical Profiles and Antioxidant Capacity in *Physalis* species

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ARTICLE INFO

Keywords:

Antioxidant activity
Greenhouse
HPLC-MS/MS
Ferulic acid
Quercetin

ABSTRACT

This study evaluated the medicinal potential of *Physalis* species by analyzing the phytochemical composition and antioxidant capacity of both wild and cultivated *P. alkekengi* genotypes compared to commercial *P. peruviana*. Among the ten specimens examined, cultivated *P. alkekengi* varieties demonstrated superior phytochemical content and stronger antioxidant effects than the commercially recognized *P. peruviana*. Analytical results revealed that the sample C5 showed exceptional antioxidant performance (by DPPH assay) and contained the highest concentrations of valuable phytochemicals, including carotenoids (614.18 mg/100g fresh weight), β -carotene (0.47 mg/100g), and vitamin C (84.61 mg/100g). Other notable findings included the sample C8 exhibiting peak phenolic content (34.12 mg GAE/g) and accession C4 containing maximum flavonoids (7.06 mg QE/g). HPLC-MS/MS analysis identified ferulic acid and quercetin as the primary phenolic compounds, while kaempferol was absent in all tested samples. Cluster analysis organized the specimens into four distinct groups, clearly demonstrating how cultivation methods significantly influence the production of bioactive compounds, particularly polyphenols, in these medicinally valuable plants. These findings emphasize the importance of selective cultivation practices to optimize the therapeutic quality of *Physalis* species.

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Poster Presentation ID: 1589

Impact of Diverse Climatic Conditions on the Morphological Characteristics and Performance of the *Physalis* in Northwest Iran

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ARTICLE INFO

Keywords:

Phytochemicals
Carotenoids
Morphological
Greenhouse

ABSTRACT

Physalis L., a valuable medicinal plant, is prized for its bioactive compounds, including flavonoids, alkaloids, and vitamin C, which contribute to its significance in traditional medicine and pharmaceutical applications, beyond its culinary uses. Climatic conditions are known to significantly affect the plant's morphological traits and yield. To explore this, a study was conducted to assess the impact of diverse climatic zones in Northwest Iran on the morphological and color characteristics of *Physalis* fruits, addressing a gap in region-specific research. The study revealed significant differences in fruit morphology across regions (ANOVA, $p < 0.05$). Greenhouse samples exhibited the highest fruit weight, length, and diameter, while the lowest length and diameter were recorded in the Khoy region, and the lowest weight was observed in the Maragheh and Khoy regions. Color attributes, measured using the CIE-Lab system (where L^* represents lightness, a^* the red-green spectrum, b^* the yellow-blue spectrum, C chroma, and h° hue angle), also varied significantly. The highest a values were recorded in the Urmia and Takab regions, with the lowest in Maragheh and Khoy. For b values, Khoy and greenhouse samples showed the highest, while Bonab, Bokan, Silvana, and Takab recorded the lowest. Notably, the greenhouse appeared in both high and low b categories, likely due to variations in controlled conditions, warranting further investigation. Fruit lightness (L) ranged from 37.78 to 67.59, with the lowest value in Bokan and the highest in greenhouse samples, Maragheh, and Khoy. Hue angle (h°) was highest in greenhouse samples and lowest in Khoy and Maragheh. Chroma (C), indicating color intensity, peaked in Urmia and Takab, and was lowest in Maragheh, Bokan, Silvana, and Bonab. Wild samples, collected from natural habitats in the region, consistently showed lower values across color metrics, suggesting environmental influence. These findings underscore the profound impact of climatic conditions on *Physalis* fruit morphology and color, offering a foundation for selecting optimal cultivation regions to maximize yield and quality. The results guide agricultural practices and pharmaceutical applications, supporting sustainable production of this medicinally significant plant.

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Poster Presentation ID: 1590

Virtual Screening of Dimeric Phenylimidazole and Phenylthiazole Compounds as NS5A Inhibitors for Hepatitis C Virus

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ARTICLE INFO	ABSTRACT
Keywords: HTVS Antiviral Virtual screening Molecular docking	Hepatitis C virus (HCV) infection continues to pose a significant global health burden, affecting tens of millions of individuals worldwide. Although notable advancements have been made in antiviral therapies, an approved vaccine remains unavailable, and treatment still relies heavily on combination regimens involving direct-acting antivirals. ¹ The non-structural protein 5A (NS5A), a key regulatory protein involved in HCV replication and assembly, has emerged as a prominent target for antiviral drug design. In this study, we focused on the in silico evaluation of dimeric phenylimidazole and phenylthiazole derivatives, structurally inspired by the clinically approved NS5A inhibitor daclatasvir. ² A total of 29,000 compounds were retrieved from the PubChem chemical database and subjected to high-throughput virtual screening (HTVS), followed by Standard Precision (SP) docking, using the Glide module within the Maestro 14.3 platform (Schrödinger). Molecular docking was conducted against the crystal structure of the NS5A protein (PDB ID: 3FQM), and the compounds were ranked according to their predicted binding affinities. From the top 850 compounds identified in the HTVS stage, nine top-ranking candidates were selected based on their SP docking results, with binding energies ranging from –10.0 to –8.75 kcal/mol. Among these, compound CID 139300031 exhibited the most favorable binding affinity and optimal docking pose, highlighting its strong potential as a lead compound for the development of novel NS5A inhibitors.

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Poster Presentation ID: 1591

The Effect of Nickel Foliar Application on Phytochemical Characteristics of Lemon balm in the Deep Flow Culture Technique (DFT)

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ARTICLE INFO	ABSTRACT
Keywords: Hydroponic Nickel Foliar application Lemon balm	This study evaluated the influence of nickel (Ni) foliar application on the phytochemical composition of lemon balm (<i>Melissa officinalis</i> L.) cultivated in a deep flow technique (DFT) hydroponic system. The experiment included four Ni treatments: control (0 mg/L), 0.078 mg/L, 0.117 mg/L, and 0.156 mg/L. The objective was to determine the optimal Ni concentration for enhancing secondary metabolite production in lemon balm, focusing on total phenolics, flavonoids, and tannins. Results indicated that Ni application significantly affected phytochemical accumulation. The highest total phenolic content (33.05 mg gallic acid equivalents/g dry weight) and total flavonoid content (12.54 mg quercetin equivalents/g dry weight) were achieved at 0.117 mg/L Ni, suggesting that moderate Ni levels stimulate the biosynthesis of these bioactive compounds. In contrast, the highest total tannin content (82.58 mg tannic acid equivalents/100g dry weight) was observed at the lower Ni concentration of 0.078 mg/L, indicating that tannin production may be more responsive to minimal Ni supplementation. The findings demonstrate that Ni plays a crucial role in modulating the phytochemical profile of lemon balm, with varying effects depending on concentration. The optimal Ni dose for enhancing phenolic and flavonoid levels was 0.117 mg/L, while tannins peaked at a lower dose. These results suggest that controlled Ni foliar application could be an effective agronomic strategy to improve the medicinal and nutritional value of lemon balm in hydroponic systems. Further research is recommended to explore the mechanisms underlying Ni-induced phytochemical enhancement and its potential applications in functional food and pharmaceutical industries.

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Poster Presentation ID: 1592

Effect of foliar application of seaweed extract (Marmarine) on antioxidant and phytochemical characteristics of pot marigold (*Calendula officinalis*) on deep water culture system (DWC)

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ARTICLE INFO	ABSTRACT
Keywords: Hydroponic Pot marigold Asteraceae Phytochemical	Pot marigold (<i>Calendula officinalis</i> L.), an important medicinal plant with notable antioxidant and anti-inflammatory properties, is widely used in pharmaceutical and cosmetic industries. This study investigated the effects of foliar application of seaweed extract (Marmarine®) on antioxidant activity and phytochemical characteristics of pot marigold grown in a deep water culture (DWC) hydroponic system. A randomized completed design (RCBD) with five Marmarine concentrations (0, 1, 1.5, and 2 mL/L) was implemented in three replications. Parameters evaluated included total phenolic content (TPC), total flavonoid content (TFC), antioxidant capacity (DPPH assays), and key bioactive compounds. Results demonstrated that Marmarine application significantly enhanced phytochemical production, with 1.5 mL/L treatment showing optimal performance - increasing TPC by 32%, TFC by 28%, and radical scavenging activity by 41% compared to control. These findings suggest Marmarine as an effective biostimulant for improving the medicinal quality of pot marigold in hydroponic production, supporting its potential for sustainable cultivation of high-value medicinal plants.

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Poster Presentation ID: 1593

Structure-Based Virtual Screening of Quercetin Derivatives as Anti-Inflammatory and Anti-Breast Cancer Agents

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ARTICLE INFO	ABSTRACT
Keywords: Quercetin Virtual Screening Cyclooxygenase-1 Estrogen Protein	Quercetin, a naturally occurring flavonoid, has demonstrated significant pharmacological potential, particularly in anti-inflammatory and anticancer therapies. [1] In this study, we performed an <i>in silico</i> evaluation of quercetin derivatives targeting Cyclooxygenase-1 (COX-1, PDB ID: 1OYE) and Human Estrogen Receptor Alpha (ERα, PDB ID: 3ERT), two key proteins involved in inflammatory processes and estrogen-dependent breast cancer, respectively. A compound library of 980 flavonoids structurally similar to quercetin (PubChem CID: 5280343) was generated using similarity search tools from the PubChem database. Molecular docking was conducted using the Glide module in Maestro 14.1 (Schrödinger), employing high-throughput virtual screening (HTVS) with a van der Waals scaling factor of 0.80 and a partial charge cutoff of 0.15 to ensure accurate assessment of binding interactions. Several quercetin derivatives exhibited stronger binding affinities than quercetin itself. Compound CID 5310534 displayed docking scores of -9.255 kcal/mol for ERα and -8.239 kcal/mol for COX-1, while CID 5391149 yielded -8.539 kcal/mol and -10.023 kcal/mol for ERα and COX-1, respectively. In contrast, quercetin showed docking scores of -8.53 kcal/mol (ERα) and -7.28 kcal/mol (COX-1). These findings suggest that specific quercetin derivatives may serve as potent dual-target inhibitors, offering enhanced therapeutic potential in managing both inflammation and estrogen receptor-positive breast cancer. This study highlights the value of computational screening in identifying promising multifunctional drug candidates and provides a foundation for further <i>in vitro</i> and <i>in vivo</i> investigations of quercetin-based therapeutics.

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Poster Presentation ID: 1595

Quercetin Derivative as a Potential ER α Inhibitors: A Computational Investigation

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ARTICLE INFO

Keywords:

Breast cancer
Virtual screening
Standard Precision
Estrogen Protein

ABSTRACT

Breast cancer is a malignancy characterized by the uncontrolled proliferation of abnormal breast cells, resulting in tumor formation that can become life-threatening if metastasis occurs. In 2022, approximately 2.3 million women were diagnosed with breast cancer, leading to 670,000 deaths globally. Most breast tumors originate from benign alterations in breast tissue, eventually progressing to malignant states¹. Estrogen receptors (ERs) existing in two major isoforms, ER α and ER β , encoded by distinct genes play a pivotal role in regulating both normal and pathological conditions in breast tissue. Importantly, ER α status serves as a critical prognostic marker and therapeutic target in breast cancer. In this study, the structural dynamics and stability of selected lead compounds complexed with the estrogen receptor (PDB ID: 3ERT) were evaluated using molecular dynamics simulations². Additionally, molecular docking and binding free energy analyses were performed to investigate the binding modes and interaction energies of the compounds. A total of 455 compounds were retrieved from the PubChem database and subjected to Standard Precision (SP) docking using the Glide module of the Maestro 14.1 platform (Schrödinger). Compounds were ranked based on their predicted binding affinities toward the estrogen receptor. From the initial library, the top ten candidates exhibited binding energies ranging from -10.0 to -8.1 kcal/mol. Among these, Quercetin 3-(6"-caffeyl)galactoside showed the most favorable binding affinity and an optimal docking conformation, suggesting its strong potential as a lead compound for developing novel 3ERT-targeted inhibitors.

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Poster Presentation ID: 1596

Phytochemical Profiling and Antioxidant Capacity of Different Organs of *Capparis spinosa* L. Grown in Ardabil, Iran

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ARTICLE INFO

Keywords:

Antioxidant activity
Phenolic acid
Phytochemicals
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Capparis spinosa

ABSTRACT

Capparis spinosa L., commonly known as caper, is a medicinally and economically important species in the Capparidaceae family, extensively cultivated in Mediterranean countries such as Greece, Italy, Turkey, Morocco, and Spain and widely distributed from Morocco to Armenia, Iran (Inocencio *et al.*, 2000). This plant is well-regarded for its diverse phytochemical profile, comprising glucosinolates, phenolic acids, alkaloids, and flavonoids, which contribute to its notable biological activities, including antioxidant, anticancer, antimicrobial, and antimutagenic properties (Zhang and Feei, 2018). As a result, *C. spinosa* has garnered increasing attention as a promising natural resource for pharmaceutical and nutraceutical development (Tlili *et al.*, 2011). This study investigated the total phenolic content (TPC), total flavonoid content (TFC), and antioxidant capacity of eight distinct plant parts, including leaves, flower buds at three developmental stages (immature, white-petal, and full bloom), fruits with pulp in varying colors (white, pink, and red), and roots. TPC and TFC were quantified using the Folin–Ciocalteu assay and the aluminum chloride colorimetric method, respectively. Antioxidant activity was evaluated using the DPPH radical scavenging assay, and phenolic acid composition was determined through high-performance liquid chromatography (HPLC). The results revealed significant differences in phytochemical content and antioxidant activity among the plant organs. Full bloom flowers exhibited the highest levels of both TPC and TFC, followed by leaves and immature buds, whereas roots had the lowest amount. Antioxidant activity found to be relatively high in both leaves and roots. HPLC analysis identified quercetin as the predominant phenolic compound in fruit extracts and chlorogenic acid as the main phenolic in flowers (full bloom stage). These findings highlight the remarkable organ-specific distribution of bioactive compounds in *C. spinosa* and underscore the potential of its floral structures as rich sources of natural antioxidants. The outcomes of this research provide a scientific basis for the selective use of specific plant organs in the formulation of health-promoting products and functional foods.

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Poster Presentation ID: 1206

Climate Drives Differences in Phytochemical and Antioxidant Properties of *Cistanche* Ecotypes

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ARTICLE INFO

Keywords:

Cistanche salsa
Cistanche tubulosa
Climate diversity
Medicinal plants
Phenolic contents

ABSTRACT

Different geographical regions, characterized by varying climatic, soil, and environmental conditions, significantly influence the quantitative and qualitative performance of medicinal plants, thereby affecting their pharmacological and antioxidant properties. The present study aimed to investigate the impact of climate on the phytochemical and antioxidant characteristics of 30 ecotypes of the medicinal plant *Cistanche*. Five major growth areas of this plant were identified within the counties of Khātam and Bafq in Yazd Province, as well as Zarand in Kerman Province. Following the collection and identification of the species (*C. tubulosa* and *C. salsa*) and the acquisition of herbarium codes, extraction was performed utilizing the Soxhlet method with two solvents: aqueous and hydroethanolic (80:20). The resulting extracts were analyzed for total phenolic and flavonoid content, free radical scavenging activity using ABTS and DPPH methods, and iron-reducing capacity (FRAP). The results of variance analysis and mean comparison using a factorial design in a completely randomized layout indicated that the highest total phenolic content (227.93 ± 3.38 mg GAE/g extract) and total flavonoid content (1548.66 ± 8.41 mg QE/g extract) were found in the hydroethanolic extract of *C. salsa* from Khātam County ($31^{\circ} 23' N$, $54^{\circ} 04' E$). Furthermore, the highest values for DPPH, ABTS, and FRAP were recorded for this ecotype at $89.91 \pm 0.4\%$, $92.14 \pm 0.4\%$, and 1.61 ± 0.02 mg TE/g extract, respectively, demonstrating significant differences ($P\text{-value} \leq 0.01$) compared to other ecotypes. These findings indicate that *C. tubulosa*, collected from the same region, ranked second in terms of these five characteristics, underscoring the superiority of this climatic region regardless of the species studied. The results of this research may serve as a foundation for future studies on the identification and utilization of *Cistanche* spp. as a medicinal plant for disease treatment, contingent upon the evaluation of other bioactive compounds.

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Future perspectives of quercetin in medicine and novel therapies

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ARTICLE INFO

Keywords:

Quercetin
Flavonoids
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Therapeutic potential

ABSTRACT

Quercetin is a flavonoid compound commonly found in the daily diet, present in various fruits and vegetables, with high concentrations in onions, berries, and dill. It plays a potential role in the prevention and management of chronic and inflammatory diseases (1). The aim of this study is to review the biological activities of quercetin, including its antioxidant, anti-inflammatory, antiviral, antidiabetic, neuroprotective, and anticancer properties. The biological activities of quercetin were examined in this research, demonstrating its beneficial effects on human health through the regulation of oxidative stress, reduction of inflammation, and modulation of immune responses. Recent studies have reported the effects of this compound in controlling diabetes and its related complications (such as neuropathy and nephropathy), cardiovascular disorders, neurodegenerative diseases like Alzheimer's, and various types of cancer, including breast and colorectal cancer. Additionally, quercetin has shown promising effects in improving metabolic syndrome, enhancing liver function in acute liver failure, supporting reproductive health, and reducing cancer-related depression and chronic orofacial pain (2). Given its wide range of pharmacological properties, quercetin is emerging as a promising natural compound in the development of novel therapeutic strategies for chronic and degenerative diseases. Integrating this plant-based compound into modern pharmaceutical practices could offer safer, natural alternatives for both prevention and treatment.

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Poster Presentation ID: 1133

Posterior Petal Micro-Morphology in Selected Species of *Astragalus* (Fabaceae, Astragaleae) and its Systematic Significance

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ARTICLE INFO

Keywords:

Cuticle
Lower Surface
Microscopy
Upper Surface
Phylogeny

ABSTRACT

Astragalus, the largest genus of flowering plants, often encounters systematic complications. New micro-morphological characteristics can be a valuable tool for addressing these issues. Therefore, this study examined the microscopic features of petals in 14 selected species from 14 sections, classified into eight main groups of old-world *Astragalus*, using Scanning Electron Microscopy. The present study is focused on the adaxial and abaxial surfaces of the middle part of a matured standard petal to minimize differences related to the developmental stage. The research identified various shapes and sizes of epidermal cells, ranging from regular to irregular polygonal (tabular) shapes with an average size of 10-15×15-30 µm or an uneven surface. Additionally, the pattern of cuticle layers was found to be striated in all species. Of course, the state of the striations was varied. Based on present results different categories for polygonal shaped cells and their patterns of cuticular layer on both petal surfaces are proposed: 1- Flat cells with straight striation, 2- Flat cells with wavy striation, 3- Rugose cells with mamillate-wavy striation, 4- Flat cells with mamillate-wavy striation, and 5-mixed patterns. These findings emphasize the importance of petal micro-morphological traits for identifying boundaries between *Astragalus* species. However, these traits may not be as effective for distinguishing at higher taxonomic levels, indicating the essential for further research to compare these traits in different petals and stages of development, while considering taxonomical, ecological, and morphological aspects.

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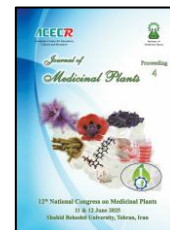
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Poster Presentation ID: 1366

From Antioxidants to Aroma: Molecular Insights into Basil's Adaptive Response to Water Deficit

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ARTICLE INFO

Keywords:

Drought stress
Antioxidant defense
Ocimum basilicum L.
Secondary Metabolites
Terpenoid
Biosynthesis

ABSTRACT

Understanding the underlying mechanisms of drought tolerance in *Ocimum basilicum* L. is essential for developing stress-resilient cultivars. In this study, we systematically investigated the impact of drought stress on the activities of enzymatic (superoxide dismutase, peroxidase, and catalase) and non-enzymatic antioxidant systems, alongside the expression profiles of key genes involved in the biosynthetic pathways of terpenoids and phenylpropanoids. The results revealed that drought stress significantly enhanced the activities of antioxidant enzymes, while the accumulation of non-enzymatic antioxidants exhibited stress-dependent variations. Quantitative real-time PCR analysis showed that the transcriptional levels of PAL, 4CL, C3H, COMT, EOMTs, and CVOMTs in the phenylpropanoid pathway, as well as genes associated with the biosynthesis of **linalool**, **germacrene**, and **β-cadinene** in the terpenoid pathway, were markedly regulated in response to drought intensity. These molecular and physiological adjustments were strongly correlated with changes in the content of aromatic secondary metabolites in essential oils. Specifically, the expression of genes involved in the biosynthesis of secondary metabolites, such as **flavonoids**, **anthocyanins**, and other aromatic compounds, including **linalool** and **terpenes**, was significantly altered in drought-stressed plants. Furthermore, the changes in non-enzymatic antioxidants such as **vitamin C** and **polyphenols** were directly correlated with increased antioxidant enzyme activity and improved resistance to oxidative stress. These findings underscore the critical interplay between antioxidant defense systems and secondary metabolite biosynthesis in mediating drought stress tolerance in basil. Our results highlight the complex interaction between molecular responses to drought stress and the production of secondary metabolites in *Ocimum basilicum*, providing a foundation for future breeding and biotechnological efforts aimed at improving drought resistance and increasing the production of valuable metabolites in this plant. This research offers novel insights for developing strategies to enhance stress tolerance and optimize medicinal properties in drought-prone plant species.

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Poster Presentation ID: 1043

***Rheum khorasanicum* Decreases Migration and Induces Apoptosis in the MDA-MB-231 Breast Cancer Cell Line**

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ARTICLE INFO	ABSTRACT
Keywords: Breast cancer <i>Rheum khorasanicum</i> Apoptosis MDA-MB231 Cytotoxicity	<i>Rheum khorasanicum</i> is a medicinal plant that belongs to the Polygonaceae family (1). Due to the limited studies on the anticancer activity of <i>R. khorasanicum</i> (2), the present study aimed to evaluate the apoptotic effect of this medicinal plant on MDA-MB-231 cells as a model for an aggressive triple-negative breast cancer that has a lower treatment option. The HPTLC assay was used to determine the main ingredients of the extract. The viability and apoptosis of the cells were evaluated by WST-1 and the annexin-V/PI dual staining assay, respectively. The scratch assay was used to assess the migratory potential of cancer cells, and the western blotting test was employed for determining the expression of Bcl-2, Bax, cleaved caspase-3, cleaved caspase-7 and procaspase-7 proteins that are involved in the apoptotic pathway. The HPTLC analysis indicated that emodin, gallic acid, and epigallocatechin are pharmacologically active compounds isolated from the hydroalcoholic extract of <i>R. khorasanicum</i> root. The extract showed a significant toxic effect on MDA-MB-231 cells up to 60 µg/mL concentration. <i>R. khorasanicum</i> root extracts also inhibited the migratory potential of MDA-MB-231 at concentrations ≥ 60 µg/mL. The plant root extract at concentrations of 60 and 100 µg/mL significantly increased the Bax/Bcl-2 ratio, cleaved caspase-3, cleaved caspase-7/procaspase-7 protein levels compared to the nontreated cells. Our findings demonstrated that the hydroalcoholic extract of <i>R. khorasanicum</i> efficiently triggered the apoptosis of MDA-MB-231 cells as a suitable model for an aggressive triple-negative breast cancer possibly through decreasing their migratory potential and stimulating the apoptotic signaling pathway.

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The Effect of Arbuscular Mycorrhizal Fungi on Growth of *Mentha piperita* L. Under Cadmium Stress

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ARTICLE INFO	ABSTRACT
Keywords: Dry weight Mycorrhiza Biological performance Cadmium Root inoculation	In order to investigate the effect of mycorrhiza inoculation on growth parameters of <i>Mentha piperita</i> L. under cadmium stress, a factorial experiment was conducted in a completely randomized design. Results showed soil contamination with cadmium did not have a significant effect on the shoot length of peppermint ($p>0.05$). Root inoculation with mycorrhizal fungi under cadmium stress significantly increased shoot length. Root inoculation with mycorrhizal increased root length by 14% compared to the control. Mycorrhizal treatment significantly increased root and leaf fresh weight by 20 and 31% compared to the control, respectively. Mycorrhization of the plant under Cd stress caused approximately 11 %, 19 % and 9 % increase in dry weight of shoots, leaves and roots compared to Cd only treatment. Mycorrhization of cadmium-contaminated soil significantly increased the fresh weight of roots and leaves by 9 % and 9 %, respectively, compared to Cd only treatment.

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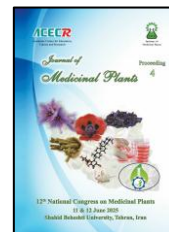
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Characterization of the Fatty Acid Profile in *Moringa oleifera* Seed Oil

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ARTICLE INFO

Keywords:

Fatty acid
Vegetable oil
Moringa oleifera
Gas chromatography
Saturated fatty acid

ABSTRACT

This study aimed to determine the fatty acid composition of oil extracted from *Moringa oleifera* Lam. seeds, which are known to be a rich source of lipids. Oil samples were prepared and analyzed in triplicate. The analytical procedure involved total lipid extraction, hydrolysis of triglycerides to release fatty acids, and subsequent derivatization to fatty acid methyl esters (FAMES). Quantitative and qualitative analyses of FAMES were performed using gas chromatography equipped with a flame ionization detector (GC-FID), in strict accordance with the protocols outlined in Iranian National Standard No. 2-13126 to ensure accuracy and reproducibility. Descriptive statistics (mean values) were used to evaluate the relative percentages of the identified fatty acids. The GC-FID results revealed that the oil was predominantly composed of unsaturated fatty acids. Oleic acid (C18:1 cis) was the most abundant component, with a mean content of 63.43%, significantly contributing to the oxidative stability of the oil. Linoleic acid (C18:2 cis), an essential polyunsaturated fatty acid, was present at a mean level of 12.26%. Among the saturated fatty acids, palmitic acid (C16:0) and stearic acid (C18:0) were major constituents, with mean values of 19.56% and 3.37%, respectively. Elaidic acid (C18:1 trans), a trans isomer of oleic acid, was also detected at 1.12%. Trans-linoleic acid (C18:2 trans) and linolenic acid (C18:3) were not detected in the samples. In conclusion, this study confirms the high oleic acid content and favorable fatty acid composition of *Moringa oleifera* seed oil, underscoring its potential value for nutritional, cosmetic, and industrial applications.

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Growth and Physiological Responses of Lemongrass (*Cymbopogon citratus*) to Varying Irrigation Regimes

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ARTICLE INFO	ABSTRACT
Keywords: Drought stress Stomatal conductance Biomass Pigments Medicinal plants	Drought stress is a critical limiting factor for plant productivity, particularly in arid and semi-arid regions where water availability is scarce. This study aimed to investigate the interactive effects of varying irrigation regimes on the growth, development, and physiological attributes of lemongrass (<i>Cymbopogon citratus</i>), a valuable medicinal plant, under controlled environmental conditions. The experimental design consisted of three irrigation treatments, 100% (no stress), 70% (mild stress), and 40% (severe stress) of field capacity, arranged in a completely randomized design with four replicates. The findings revealed significant disruptions in physiological processes and a pronounced reduction in plant biomass as drought stress intensified. Notably, severe drought stress (40% field capacity) led to substantial declines in key growth parameters, including leaf fresh weight (44%), leaf dry weight (42.5%), leaf relative water content (29.5%), and photosynthetic pigment content (51.6%), relative to the control (no stress). Moderate drought stress (70% field capacity) also negatively affected these parameters, though to a lesser extent. These results underscore the sensitivity of lemongrass to water deficits, highlighting that both moderate and severe drought stress significantly impair physiological functions and biomass accumulation. To optimize the cultivation of this medicinally important species, maintaining adequate irrigation is essential. Given the observed impacts, further investigations are necessary to precisely delineate the drought stress thresholds for lemongrass, with a particular focus on the dynamics of secondary metabolite production under diverse irrigation regimes.

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Investigation of Phenolic and Flavonoid Content Changes in Okra (*Abelmoschus esculentus*) Seeds During Germination

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ARTICLE INFO	ABSTRACT
Keywords: Okra Germination Metabolite Content Flavonoids Phenolic Compounds	Phenolic and flavonoid compounds are bioactive secondary metabolites that play crucial roles in plant defense and human health. Their strong antioxidant, anti-inflammatory, and anticancer properties have made them valuable for pharmaceutical, nutraceutical, and food industries. Enhancing the levels of these compounds in plant-based foods can significantly contribute to improved health outcomes [1]. This study investigates and compares the physicochemical and biological characteristics of okra (<i>Abelmoschus esculentus</i>) seeds in their raw and germinated states, focusing on the effects of germination on these properties. A primary objective is to explore the metabolic alterations during the germination process. Additionally, changes in the levels of phenolic and flavonoid compounds were assessed before and after germination. Germination represents a critical developmental stage characterized by the emergence of the radicle through the seed coat, influenced by environmental and endogenous factors [2]. Analysis of total phenolic and flavonoid contents showed significant increases following germination. The total phenolic content rose from 11.44 mg gallic acid equivalents (GAE) per gram of dry extract in raw seeds to 17.98 mg GAE/g in germinated seeds, corresponding to an approximate 57.2% increase. Similarly, the total flavonoid content increased from 11.51 mg rutin equivalents (RE) per gram of dry extract in raw seeds to 13.84 mg RE/g in germinated seeds, indicating an approximate 20.2% increase. The substantial elevation in phenolic and flavonoid compounds post-germination suggests that germinated okra seeds possess enhanced bioactive properties, potentially offering greater health benefits due to the increased concentration of these vital secondary metabolites.

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Impact of Germination on Phenolic and Flavonoid Enrichment in *Nigella sativa* L. Seeds

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ARTICLE INFO	ABSTRACT
Keywords: <i>Nigella sativa</i> Germination Metabolite Content Flavonoids Phenolic Compounds	In this study, the total phenolic and flavonoid contents of <i>Nigella sativa</i> (black seed) were evaluated before and after the germination process. Germination represents a crucial physiological stage in the plant's life cycle, during which the transition from a dormant seed to an actively growing seedling occurs. This process initiates with the absorption of water, which triggers metabolic reactivation, and proceeds with the emergence of the radicle through the seed coat under the influence of environmental and endogenous factors. In addition to the morphological changes that accompany germination, significant biochemical alterations take place, particularly in the content of secondary metabolites such as phenolic and flavonoid compounds, which are associated with the plant's bioactive properties [1]. Several studies have shown that germination activates numerous biosynthetic pathways within seeds, leading to the accumulation of bioactive compounds. This process not only enhances the nutritional profile but also increases the antioxidant capacity of sprouts. Therefore, germination can be considered as a natural and effective strategy for improving the health-promoting properties of plant seeds, making them more beneficial for both dietary and therapeutic applications [2]. The results obtained in this research, demonstrated that the total phenolic content in black seed sprouts was 19.46 mg gallic acid equivalents (GAE) per gram of dry extract, whereas the ungerminated seeds contained only 11.96 mg GAE/g dry extract indicating an approximate 286% increase following germination. Similarly, the total flavonoid content increased from 9.57 mg rutin equivalents (RE) per gram of dry extract in the seeds to 31.4 mg RE/g dry extract in the sprouts, corresponding to an approximate 228% enhancement. These findings highlight that the germination process significantly enhances the concentration of bioactive secondary metabolites in <i>Nigella sativa</i>, which could potentially improve its nutritional and therapeutic value.

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The effect of naphthalene acetic acid and different culture media on the rooting of different genotypes of lavender plant (*Lavandula* spp.)

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ARTICLE INFO	ABSTRACT
Keywords: Lavender Naphthalene Acetic Acid Culture medium Genotype	Cultivation of medicinal plants and the production of its products can be a national necessity and within the framework of a specific program and society [1]. Lavender (<i>Lavandula</i> spp.) with 39 species from the mint family (Lamiaceae) is a perennial and woody plant with essential oil, which is widely used in the pharmaceutical, health and food industries [2]. Many soilless organic substrates are made from different proportions of peat, coconut peat, pine bark and vermiculite and are important because they determine the water holding capacity and ventilation of the substrate [3]. In order to investigate the effect of NAA and different culture media on the rooting of different genotypes of lavender (<i>Lavandula</i> spp.) in a factorial pot experiment based on a completely randomized design with three replications (two units) was implemented. The investigated treatments include two culture media (perlite, peat moss+perlite), two levels of NAA concentration (zero and 4000 mg/liter) and six genotypes of lavender (<i>L. dentate</i> , <i>L. angustifolia</i> cv. Hidcote, <i>L. angustifolia</i> cv. Munstead, Lavandin, <i>L. stricta</i> , <i>L. stoechas</i>). The results of analysis of variance showed that NAA had a significant effect only on the root length and did not affect the other investigated parameters. The two culture environments had similar results and did not create a significant difference for any characters. Results of six genotypes had significant differences, so that <i>L. dentata</i> had the longest root length (11 8.8 cm), <i>L. stricta</i> , the largest callus diameter (0.24 mm), <i>L. angustifolia</i> cv. Hidcote, the lowest survival percentage and Lavandin had the highest number of new sprouts.

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