Medicinal and Aromatic plants in Labiatae family in Iran

V. Mozaffarian
Momber of Scientific board of Research Institute of Forests and Rangelands, Depatment of Botany.

Abstract
Labiatae family with Botanical Characters: Herbs or shrubs, stems often 4-angled. Leaves exstipulate, simple, sometimes pinnate, always opposite. Inflorescence of cymes borne in the axils of bracts or upper leaves and usually contracted to form false whorls (verticillasters), is one of the largest plant families with ca. 48-50 Genus and ca.400 often aromatic species in Iran. The most largest genus in the family are

Nepeta 79 species
Salvia 61 species
Stachys 35 species
Scutellaria 27 species
Phlomis 19 species
Eremostachys 17 specie

Between plants of the Labiatae family there are some Genus and species which are used in traditional medicinal plants in Iran before being acquaint with modern Medicinal plants and some of them are used by local people as vegetable. Most famous of them are:

Teucrium / Maryam Nokhudi
Marrubium / Frasiun
Otostegia / Golder, Kase Gol
Dracocephalum / Badranj bu
Hyssopus / Zufa
Ziziphora / Kakuti
Satureja / Marze
Origanum / Marzanjush
Thymus / Avishan
Zataria/ Avishane Shirazi
Mentha / Pune
Melissa / Faranjmoshk
Zhumeria Mure Khush
Salvia
Perovskia
Lavandula
Ocimum

In folk medicine people are believed that most of the plant species in Labiatae family have sweet odor, but there are some genus which are foetid and with unpleasant odor as:

Nepeta
Stachys
Scutellaria
Phlomis
Eremostachys

May be we say that all of the Salvia species have pleasant odor if rather bitter and pungent.
Here we refer to some well known medicinal Genus and species of Labiatae plant family

Dracocephalum Moldavica /ب Badranj buyem, Badrashbi
Hyssopus angustifolius / Zufa
Lallemantia iberica / Balangu
Lamium album / Gazane sefid
Lavandula spp. / Ostokhuddus
Marrubium vulgare / Frasiun
Melissa officinalis / Faranjmoshk, Varang bu
Mentha spp. / Pune
Nepeta Cataria / Pune saye Gorbeii
Ocimum Basilicum / Reihan
Origanum vulgare / Marzangush, Marzanjush
Otostegia persica / Golder, Kase Gol
Perovskia abrotanoides / Berazambal
Rosmarinus officinalis / Romaran, Rosmary
Salvia officinalis / Maryam Goli
Satureja hortensis / Marze
Stachys lavandulifoia / Chaye Kuhi
Teucrium poliu / Maryam Nokhudi
Thymus vulgaris / Avishane Baghi
Zataria multiflora / Avishane Shirazim, Saatar
Zhumeria Majdae / Moure khush
Ziziphora tenuior / Kakuti

Ex situ conservation of ornamental, medicinal *Viola* and *Pulsatilla* species threatened with extinction

Aneta Słomka[1*], Justyna Żabicka[1], Piotr Żabicki[1], Teresa Nowak[2], Monika Jędrzejczyk-Korycińska[2], Elwira Śliwińska[3], Grzegorz Migdałek[4], Błażej Ślązak[5], Klaudia Sychta[1], Monika Kwiatkowska[1], Elżbieta Kuta[1]

[1]*Institute of Botany, Faculty of Biology, Jagiellonian University, Gronostajowa 9, 30-387 Cracow, Poland;*
[2]*Department of Botany and Nature Protection, University of Silesia, 28 Jagiellońska; 40-032 Katowice, Poland;*
[3]*Department of Agricultural Biotechnology, UTP University of Science and Technology, Prof. S. Kaliskiego Ave 7., 85-789 Bydgoszcz, Poland;*
[4]*Institute of Biology, Pedagogical University of Cracow, Podchorążych 2, 30-084 Cracow, Poland;*
5W. Szafer Institute of Botany, Polish Academy of Sciences, 46 Lubicz, 31-154 Cracow, Poland

Abstract

Many species of *Viola* L. and *Pulsatilla* Mill. are currently threatened with extinction in various regions worldwide. Their population decline due to global climatic and environmental changes. Beauty of flowers and use of plants as a source of chemicals (plants are dug up for gardens and for obtaining secondary metabolites important for medicine with various biological activity and acting as antioxidant, antimicrobial and cytotoxic agents) are the main reasons of the destruction of their natural sites. Poor seed germination and limited vegetative propagation do not favour species spread. Active protection of these species and restoration of disappearing populations are rapidly desired. *In vitro* culture and cryopreservation technique serve as an excellent biotechnological tool for *ex situ* conservation of endangered species as well as to produce pharmaceutically important secondary metabolites. Our long-term studies focused on developing efficient protocols for micropropagation (or/and callus production) of several endangered medicinal/ornamental *Viola* species (*V. uliginosa*, *V. tricolor*, *V. lutea* ssp. *calaminaria*, *V. lutea* ssp. *westfalica*, *V. epipsila*, *V. stagnina*) and *Pulsatilla* (*P. vulgaris*, *P. patens*). The initial material were plant organs (leaves, petioles) or seedling fragments (shoot tips, hypocotyls, cotyledons). Organogenesis (adventitious shoots) and/or somatic embryogenesis were induced on solidified MS (Murashige and Skoog) medium supplemented with the combination of cytokinins and auxins or with only one plant growth regulator. Rooting shoots or seedlings converted from somatic embryos were gradually acclimatized to *ex vitro* and field conditions. Genetic fidelity of regenerated shoots/plantlets with the source material was confirmed by estimation of genome size by flow cytometry and molecular markers (AFLP, ISSR). *Viola stagnina* was successfully micropropagated (Żabicki et al. 2019) and shoots were introduced to preservation in liquid nitrogen. Cyclotides (cyclic peptides produced by *Viola*) biosynthesis during *in vitro* cultivation of *V. uliginosa* depended on tissue and of plant growth regulators type (Slazak et al. 2015). The great achievement was obtaining regenerants *via* organogenesis and somatic embryogenesis from seeds of the endangered *Pulsatilla patens* and its reintroduction into the wild. Large population of this species had disappeared in Jaworzno (Poland) ~20 years ago. Over 100 individuals were successfully transplanted into their natural site enhancing biodiversity of calamine grassland and restoring the population of this species.

Key words: *in vitro* culture, organogenesis, somatic embryos, genetic uniformity.

Cyclic peptides-cyclotides biosynthesized by *Viola* species strengthen the tolerance to heavy metals acting as a defense system

Klaudia Sychta[1*], Błażej Ślązak[2], Aneta Słomka[1], Ulf Göransson[3], Elżbieta Kuta[1]

[1]Department of Plant Cytology and Embryology, Institute of Botany, Faculty of Biology, Jagiellonian University, Poland
[2] W. Szafer Institute of Botany, Polish Academy of Sciences, Poland
[3]Department of Pharmaceutical Biosciences, Research; Pharmacognosy, Uppsala University, Sweden

Abstract

The *Viola* genus is rich in species tolerant to heavy metals. Long term studies showed that both metallicolous (MET - occurring on polluted areas) and non-metallicolous (NMET - growing on non-polluted soils) species tolerate high concentrations of heavy metals (Zn and Pb) at the level of the whole plant and isolated cells in suspension. Metal tolerance depends on many factors, among which the secondary metabolites produced by plants play an important role. The species of Violaceae family produce cyclic peptides-cyclotides whose primary function is *defense* against insect pests. The question arises whether cyclotides could play a role in plant protection against abiotic factors, including heavy metals?. The *Viola* species/genotypes, representing different tolerance level to heavy metals (MET, NMET) were selected as a source material for the study. The first step was to detect the distribution of heavy metals (Zn, Pb) in cell organelles using cell suspension culture and transmission electron microscopy with X-ray microanalysis. Pb or Zn in *V. tricolor* NMET cells were deposited in vacuoles and cell wall, small particles were also found in cytoplasm and nucleus (Sychta et al. 2018). Cyclotides biosynthesis was determined in plants collected from MET and NMET soils and in plants (NMET and MET genotype) growing under *in vitro* conditions. The LC-MS technique showed that *V. tricolor* plants collected from MET soils produced more cyclotides than plants from NMET sites. The plants (NMET, MET genotype) growing under *in vitro* conditions (control, free from heavy metals) did not differ in the production of cyclotides. It suggest that the presence of heavy metals stimulate cyclotide production. The cyclotide biosynthesis pattern was also determined in suspended cells of NMET and MET *Viola* species treated with 200 and 2000 μM of zinc or lead for 24 and 72 h, using MALDI-MS technique. Results showed that most of cyclotides were overproduced in the MET genotypes, contrary to NMET genotypes with not increased content of cyclotides after metal treatment. The biosynthesis of cyclotides after treatment with heavy metals was increased, especially in treatments with high concentration of Zn and low doses of Pb.

Conclusion: The increased biosynthesis of cyclotides after exposure to heavy metals, in plants from MET sites and the deposition of cyclotides and heavy metals in vacuoles indicates that these peptides may strengthen heavy metal tolerance in violets. Also the presence of heavy metal binding sites in cyclotide chemical structure suggests that these peptides could have an important share in heavy metal binding and detoxification.

Keywords:Heavy metal tolerance, cyclotides, metallophytes, dotoxification.

TRUFFLE CULTIVATION WITH HOST TREES

Pierre SOURZAT[1]

[1]Truffle Expert, Bel Air, 46240, Ussel, (France).
Editor-in-chief of the French magazine "LE TRUFFICULTEUR" (The Truffle Grower).
Former Director of the Truffle Research Center in Cahors-Le Montat (France).

Abstract

Truffle's production cannot be done without the symbiosis between the fungus and a host tree. The black truffle of Périgord *Tuber melanosporum* generally has oaks *Quercus pubescens, Quercus ilex* as host trees. Many tree species can also produce *Tuber melanosporum*: *Quercus robur, Quercus coccifera, Corylus avellana, Carpinus betulus, Pinus* sp., *Cedrus atlantica, Tilia platyphyllos,* even some species of *Cistus (albidu, incanus).* These different host trees can also produce other species of truffles: *Tuber aesticum/uncinatum, Tuber mesentericum, Tuber brumale, Tuber excavatum, Tuber rufum, Tuber borchii*, and fungus like *Boletus* sp. *Tricholoma* sp., *Russala* sp. One of the limiting factors in the cultivation of truffles is the contamination of host trees by undesirable mycorrhizal species. The symbiosis between the tree and the truffle results in the presence of symbiotic organs called mycorrhizae on the root system. Mycorrhizae are places of nutritional exchange between the tree and the fungus. They make it possible to perpetuate the fungus on the host tree. Truffle cultivation is dependent on the production of mycorrhizal plants by the desired species. in France, Spain, Italy but also in Australia, New Zealand North Africa (Morocco) and South Africa, and different other countries, nurserymen are specialized in the making of mycorrhizal trees to producing truffles. The main species of cultivated truffles are: *Tuber aesticum/uncinatum, Tuber mesentericum, Tuber borchii.* Since 2020, we know that it is possible to cultivate the precious Italian white truffle, *Tuber magnatum*, through the planting of mycorrhizal trees like *Quercus pubescens*. The principal requirements for successful truffle production are :1) using well mycorrhized plants, 2) suitable soil, 3) Mediterranean or Atlantic climate, 4) Cultivation practices designed to maintain an equilibrium which favors the fructification of a pioneering type of fungus like *Tuber melanosporum*. The main truffle cultivation techniques are divided into soil maintenance, water management (watering), tree pruning, and also the supply of spores to strengthen the truffle potential. The purpose of the tillage (soil maintenance) is to aerate it and facilitate the growth of truffles. With climate change, irrigation of truffle plantations becomes essential. Truffle growers provide 20 mm of water every 10 days on average. The trees are pruned to maintain an open space required by *Tuber melanosporum*. In conclusion, truffle cultivation consists to manage balance between main different factors: 1) soil, 2) water and climate, 3) growth of the tree and mycorrhizas propagation.

Keywords *:* Host trees, *Tuber melanosporum, Tuber aestivum/uncinatum,* mycorrhizae, tilling, irrigation, pruning.

FATTY ACID COMPOSITIONS OF LINSEED (*LINUM USITATISSIMUM* L.) USED AS OIL AND FIBER CULTIVATED IN TURKEY

İrem Ayran[1] Asuman Kan[2] Amir Rahimi[3]

[1]Selçuk University, Agriculture Faculty, Department of Medicinal Plants, Konya/TURKEY
[2]Konya Technical University, Vocational School of Technical Sciences, Department of Food Processing, Konya/TURKEY
[3]Department of Plant Production and Genetics, Faculty of Agriculture and Natural Resources, Urmia University,Urmia/ IRAN

[1]Correspondence: e-mail: irem.ayran@gmail.com phone + 90-505 939 31 35

ABSTRACT

In this research, fatty acid yield and composition among the linseed *Linum usitatissimum* L genus (used oil and fiber) in Turkey, researched and compared. The oil yields of linseed for used oil was determined 14.02%, while the oil yields of linseed for used fiber was determined 10.35%. The major fatty acid compositions of linseed for used oil was linoleic acid (53.7%) and the other main components was determined as linoleic acid (15.6%), oleic acid(19.7%), palmitic acid(5.7%) and stearik acid (3.3%), respectively. The major fatty acid compositions of linseed for used fiber was linoleic acid (35.4%) and other significant components were linoleic acid (30.8%), oleic acid(20.4%), palmitic acid(6.1%) and stearik acid (4.3%), respectively. The aim of this study was to determine the oil yield and fatty acid composition of linseed genus, are cultivated in Samsun, Turkey. According to the results of this study, information about fatty oil yields and compositions of every both genus were been evaluated. The linseeds have a very important place due to fatty oil, nutrients constant and fibers used in textiles. The oil obtained from the seeds of the plant is used in the treatment of many diseases with medical purposes, food products and textiles.

Keyword: Linseed, *Linum usitatissimum* L., composition, fiber, fatty oil

CHEMICAL COMPOSITION OF THE FATTY OIL OF *BOROGA OFFICINALIS* L. SEEDS FROM TURKEY

İrem Ayran[1] Yüksel Kan[1] İdris Abakay[1]

[1] Selçuk University, Agriculture Faculty, Department of Medicinal Plants, KONYA/TURKEY

[1]**Correspondence:** e-mail: irem.ayran@gmail.com phone + 90-505 939 31 39

ABSTRACT

In this study, Borage (*Borago officinalis*), cultivated in Konya province, Turkey, seeds oil yield and its components were investigated. The fatty oil yield obtained from borage seed was determined as 21.35%. The results showed that the major composition of borage seeds oil were linoleic acid (31.1%), oleic acid (27.8%), linolenic acid (12.9%), palmitic acid (12.8%), stearic acid (5%), eicosenoic acid (4.2%), erucic acid (2.7%). nervonic acid (1.5), respectively. This results of fatty oil compositions are within the standard limits of borage seeds oil in European Pharmacopoeia. According to the results of this study, it is important in terms of the fatty oil yield and chemical compositions. Borage seed oil is a valuable because of fatty oil composition, although it is commercially cultivated for medicinal and culinary uses.

Keyword: Borage, *Borago officinalis* L., composition, fatty oil

Intellectual Property on breeding on medicinal varieties and biotechnology

Farhad Kheiri

Director of Plant Variety Protection and Registration

Seed and Plant Certification and Registration Institute

Plant Variety Protection is an instrument to encourage commercial plant breeders to invest for improving existing plant varieties by insuring that breeders receive sufficient remuneration when they market the propagating material of those improved varieties.

Medicinal plants play an important role in terms of employment, exports, economic growth and many other factors in the Iranian economy. Creating and developing new varieties of medicinal plant can greatly help the growth of this fledgling sector in the country. This also depends on the legal protection of breeders of this group of plants under the plant variety rights rules. Plant variety rights (PVRs) came into operation in 2011 under the provision of the bylaw on plant variety protection of the act on plant variety protection and seed certification (2003).

To protect the ownership of a variety, breeders (Legal entities or natural persons) can apply for the Plant Breeders' Rights for the variety. A grant of plant variety rights may be made if the variety is:

- **New**, meaning not sold in Iran for more than 12 months, and overseas for more than four or six years (depending on the type of plant).
- **Distinct**, meaning distinguishable from any other known variety by one or more (morphological or physiological) characteristics.
- **Uniform,** meaning that there is little difference between all the plants of a particular generation.
- **Stable,** meaning that successive generations retain the characteristics of the original variety.
- has an acceptable denomination, and
- formalities are met.

If a new variety complies with DUS criteria and has been given an accepted name, the Plant Breeders' Right will be granted. As long as the variety is protected the following acts in respect of the propagating material of the protected variety shall require the authorization of the breeder:(i) production or reproduction, (ii) conditioning for the purpose of propagation, (iii) offering for commercial sale, (iv) exporting, (v) importing, (vi) stocking for any of the purposes mentioned in (i) to (v) above. The breeder’s right shall be granted for a fixed period of 18 years for all type of plants.

Keywords: Variety protection, Plant breeding, Seed and plant Certification.

Genetic and biochemical diversity assessment of promised population thyme collected from Iran

Parviz Moradi*, Gholamreza Taherion, Hosein Hoseini monfared, Majid Najafi, Farhad Aghajanloo, Mohammad Shojaie

Research Division of Natural Resources, Zanjan Agricultural and Natural Resources Research and Education Centre, AREEO, Zanjan, Iran

*Corresponding author: p_moradi@areeo.ac.ir

Abstract

Thymus is the eighth important genera of Lamiaceae family with regard to the number of containing species. It's been used as a medicinal, aromatic and spicy plant. Demand for thyme products is growing and is not likely to be supported by collecting from natural populations because of insufficient/irregular rainfall in traditional source areas as well as destruction of its natural habitat. In this investigation nine populations (four population of *Thymus kotchyanous* from different part of Iran, one population of *Thymus daenensis* collected from Zanjan and four cultivars of Thymus vulgaris) planted in RCBD design with 3 replicates. Morphologically important traits were recorded to assess the genetic diversity within the Thymus genus. Considering Dry matter yield, *T. danensis* with 4.5 tons/ha and 60% thymol component in essential oil has been selected as the most recommended population for cultivation in the cold region conditions. In the second rank, *T. kochyanous* code 54 had 3.5 tons/ha dry matter yield and % 60 carvacrol content in essential oil samples. In conclusion, *T. daenensis* and *T. kotchyanous*_70 could selected for next phase of seed production.

Keywords: Thyme, Variation, Thymol, Carvacrol, Iran

Effect of stress modifiers on physiological, antioxidant activity and yield characteristics of *Thymus vulgaris* L under water-deficit stress

Mahdi Manji Mohammadi[1], Amir Rahimi[2]*, Sina siavash Moghadam[2] and Saeid Heydarzadeh[4]

1- Master student in Agronomy, Faculty of Agriculture, Urmia University, Urmia. Iran.
2 – Assistant and Associate Professor, Faculty of Agriculture, University, Urmia, Iran.
3-PhD Graduate of Agronomy, Faculty of Agriculture, Urmia University, Urmia. Iran.

*Corresponding author: emir10357@gmail.com

Abstract

To investigate the effect of stress modulators on physiological, antioxidant and yield characteristics of thyme in drought stress conditions, factorial experiment is performed in the form of a randomized complete block design with 10 treatments and 3 replications in 2019-2020 growing season. Factors included stress modulators at 5 levels (zinc, amino acid, humic acid, seaweed and control) and irrigation regimen at 2 levels (irrigation every week and irrigation every two weeks). Based on the results, the interaction of the irrigation every week and humic acid produced the highest total phenol (27.90 mg g^{-1} DW), total flavonoids (1.47 mg g^{-1} DW), essential oil yield (1.18 Kg ha^{-1}), biological yield (1780.50 Kg ha^{-1}) and grain yield (376.94 Kg ha^{-1}). Whereas, proline content was higher in the interaction of the irrigation every two weeks conditions and the control plants. Moreover, the simple effects of irrigation every week and humic acid and seaweed treatments showed the highest total chlorophyll (2.76 mg g-1 FW) and carotenoid contents (1.12 mg g-1 FW), relative water content (78.48 %), the content of phosphorus (0.66 mg g^{-1} DW) and potassium (18.26 mg g^{-1} DW), essential oil (0.17%), oil percentage (25.97%) and oil yield (155.28 Kg ha^{-1}) among which amino acid and zinc with a slight difference had similar effects. The spraying plants with humic acid, seaweed and amino acid in irrigation every week conditions had higher antioxidant activity. So regarding these traits, it is recommended that stress modifiers such as humic acid, seaweed and amino acid can help organic crops expand under water-deficit stress.

Keywords: Antioxidant, Humic acid, Seaweed, Irrigation, Sustainable agriculture

Investigation of physiological characteristics of *Thymus vulgaris* L. under water stress conditions and fertilizer

Mahdi Manji Mohammadi[1], Amir Rahimi[2]*, Sina siavash Moghadam[2] and Saeid Heydarzadeh[4]

1- Master student in Agronomy, Faculty of Agriculture, Urmia University, Urmia. Iran.
2 – Assistant and Associate Professor, Faculty of Agriculture, University, Urmia, Iran.
3-PhD Graduate of Agronomy, Faculty of Agriculture, Urmia University, Urmia. Iran.

*Corresponding author: emir10357@gmail.com

Abstract

In order to investigate the effect of organic fertilizers on quantitative and qualitative properties of Thyme plant under stress conditions, A factorial experiment in the 2019-2020 based on a Randomized Complete Block Design with 12 treatments at the research farm of the Faculty of Agriculture, Urmia University and three replications was conducted with two factors assigned: The first factor was irrigation regime in three levels of 60, 90, and 120 mm of evaporation from Class A pan as well-watered, mild, and severe stress, respectively, and the second factor: the application of organic fertilizers at sowing time at four levels of vermicompost, compost, animal manure and control in which no fertilizer was applied. The results showed that with a delay in irrigation photosynthetic pigments and soluble sugars decreased, while the application of low water stress increased the amount of essential oil and the highest amount of essential oil (2.61±0.11%) and essential oil yield (3.68±0.22 g/m2) were observed in moderate stress conditions. Meanwhile, the highest photosynthetic pigments and soluble sugars and the amount of essential oil and essential oil yield were obtained in the application of vermicompost. However, the highest amount of proline was obtained under severe stress conditions, while reduced proline content by an average of 29% under application of vermicompost compared to the control. Water deficit decreased nutrient uptake (NPK) and relative water content, showing that Thyme was sensitive to drought, and organic fertilizers application improved nutrient uptake (NPK) and relative water content of the plant within irrigation levels. The content of total phenol, flavonoids, biological yield and seed yield of Thyme increased by 33, 24, 38 and 24% in optimal irrigation conditions and 28, 14, 27 and 21% in moderate stress conditions and 25, 11, 22 and 16% were observed in severe water stress conditions in plants treated with vermicompost compared to the control treatment respectively. Based on the results, it can be concluded that in each of the water stress levels, the use of organic fertilizer is more effective in improving the quantitative and qualitative characteristics of Thyme and it is better to increase the efficiency of agricultural products from organic inputs instead of use chemical fertilizers with the aim of reducing pollution and achieve sustainable agriculture.

Keywords: Antioxidant, Fertilizers, Drought stress, Sustainable agriculture

Combined bio-chemical fertilizers ameliorate antioxidants attributes of (*Nigella sativa* L.)

Samira Moradzadeh[1], Sina Siavash Moghaddam[1*], Amir Rahimi[1], Latifeh Pourakbar[2] , R. Z.Sayyed [3]

[1]Department of Plant Production and Genetics, Faculty of Agriculture, Urmia University, Urmia, Iran

[2]Department of Biology, Faculty of Science, Urmia University, Urmia, Iran

[3]Department of Microbiology, PSGVP Mandal's Arts, Science, and Commerce College, Shahada, Maharashtra 425409, India.

***** Correspondence:

Sina Siavash Moghaddam (S.S.M)

Email: ss.moghaddam@urmia.ac.ir

Abstract

Nigella sativa L. is a nutraceutical herb with extensive pharmaceutical and biological properties. Currently, reducing the application of chemical fertilizers (synthetic fertilizers) causes serious problems toenvironmental pollution and human health. Therefore, the combined effect of urea and biofertilizers was studied on the antioxidants traits of *N. sativa* L. in a randomized complete block design with 10 treatments and three replications. The treatments included control (no fertilization), U (100% chemical fertilizer as urea), Nb (Nitrogen biofertilizer) , Pb (Phosphate biofertilizer) , Kb (Potash biofertilizer) , NPKb (NPK biofertilizer), Nb+ 50% U , Pb + 50% U , Kb +50%U and NPKb + 50%U. The analysis of variance revealed that the treatments affected all the traits significantly ($P < 0.01$). The highest total DPPH free radical scavenging (33.47%), Superoxide radical scavenging (59.50%) and chain-breaking activity (1.02%) were related to the treatment of NPKb + U50%. There is, therefore, a definite need for applying combined fertilizer system as a method to achieve sustainable agriculture. In sum up, the application of NPKb + U50% as bio-chemical fertilizers improved *N. sativa* L antioxidants attributes.

Keywords: Synthetic fertilizer, Biofertilizer, Antioxidants, Black cumin.

Gc-Ms Analyzing of some Achillea sp. In Zanjan provenance

Hossein Rabbi Angourani*

1-Assistant Professor Research Institue of Modern Biological Techniques, University of Zanjan, Zanjan, Iran. **Rabbihosein@znu.ac.ir**

Abstract

Achillea genus is belonging to Asteraceae. There are more than 115 species of this genus in the world and there are 19 herbaceous species in Iran that are often fragrant and about 3 to 4 species are used medicinally. The composition of the active ingredients of plants in different climatic conditions show very different constituent in phytochemical propertiesand , In order to investigating quantity and quality of essential oils of three species of achillea including *Achillea wilhelmsii* C. Koch, *Achillea tenuifolia Lam*, *Achillea millefolium* in Zanjan provences. plant samples collected from northern heights of Zanjan After selecting a suitable plants, after harvesting the whole vegetative body of the plant was harvested in the full bloom time and after drying in room shade, it was powdered as a homogeneous mixture and its essential oil was extracted by distillation with water. Then, the components of the essential oil were identified and the amount of the components was identified using a gas chromatography device connected to a mass spectrometer. The results showed that the essential oil of *Achillea wilhelmsii* C. Koch had a yellow color with a yield of 0.89%. The results of GC-MS showed that the essential oil of this plant is composed of 106 substances in which 15 representative compounds 54% were total essential oil. In the study of essential oil *of Achillea tenuifolia* Lam, it was found that 20 substances constituted 54.37% of essential oil. Also, the essential oil of *Achillea millefolium* was white with a yield of 0.74%, GC-MS results showed that this essential oil The plant in the region is composed of 105 substances, of which 10 compounds represented 50.78% of the total essential oil.

Keywords: Achillea, essential oil, Phytochemistry, Chromatography

Diffusion modelling of COVID-19 by using natural and safe microparticles

Ali ammarellou[1*] and Mario coccia[2]
1 *: Research Institute of Modern Biological Techniques, University of Zanjan, Zanjan, Iran.
amarlou@znu.ac.ir
2. National Research Council of Italy, IRCRES-CNR, Italy.

Abstract
A dangerous and novel human coronavirus (COVID-19) which emerged in Wuhan, China, in late of 2019, is rapidly spreading all over the world, generating a high number of total deaths. Since practical and direct aerosol study of COVID-19 is a very hard work and needs to have very safe and secure conditions, and at the same time, the possibility of contamination of the devices and the tested environment are very serious, so using and modelling of safe and natural particles behavior in air is an important alternative method of inquiry that revels interesting findings. We evaluated aerosol transmission and spread behavior of spores of two wild mushrooms. The first was *Calvatia booniana* with spore size about 1 to 2 µm and the second was *Terfezia claveryi* Chatin with 20 µm. Firstly, we stained both types of spores with Giemsa and *Methylene* blue, and carefully recorded the morphological shape of the two micro particles, which were different in size and cytological characteristics under an optical microscope. We pumped the solution containing both large and small spores by special sprayers in covered air flow tunnels, 3*3*3 cm^3, 10 meters long. Because at intervals of half a meter inside the air tunnel, thin glass plates were placed for the settle of particles. After half an hour we examined the presence and frequency of spore particles settling on the glass placed under the microscope. Based on our primarily results, the larger micro particles with diameter of 20 μm, can diffused about 60 to 70 cm, but small microparticles (2 μm) were spread about 200 cm. Since the COVID-19 is about 100 nanometers in size and assumes a direct ratio of size with the particle mass (m) and using the classical kinetic energy formula (½ mv^2), we estimated the approximate diffusion of COVID-9 more than 8 - 9 meters in room air condition. Hence, results here revel that it is important, very important to know that the Coronavirus 2019 and similar viral agents spread through air in order to apply appropriate control measures directed to prevent the diffusion of the SARS-CoV-2 and similar pandemics.

Keywords: COVID-19, aerosol, airborne transmission, micro particles, mushroom.

Effect of Cold Plasma on Essential Oil Content and Composition of Cumin (*Cuminum cyminum* L.)

Fatemeh Shokoohi[1], Mohammad-Taghi Ebadi[1, *], Hamid Reza Qomi[2], Mahdi Ayyari[1]

[1] Department of Horticultural Science, Tarbiat Modares University, Tehran, Iran
[2] Laser and Plasma Research Institute, Shahid Beheshti University, Tehran, Iran.
E-mail: mt.ebadi@modares.ac.ir

Abstract

The current research was carried out to reveal the possible impacts of cold plasma on essential oil (EO) content and composition of cumin (*Cuminum cyminum* L.), as a new approach in medicinal plants processing. Cumin seeds were exposed to plasma at different voltages (17, 19, 21, and 23 kV). The EO content was determined using hydro-distillation, and the compositions of the extracted EOs were quantified using gas chromatography and gas chromatography-mass spectrometry techniques. The results showed that with increasing voltage intensity from 17 to 23 (kV), the hydrophilicity of cumin seeds and EO content (extraction efficiency) increased. Also, %25 color change was observed between the control and the treated samples. Major constituents of EO included β-pinene (%5.5-12.2), p-cymene (%8-11.2), (*E*)-beta-ocimene (%15.7), cumin aldehyde (%23.9-47.6), γ-terpinene (%25.3-37.5). The EO analysis results showed that cumin aldehyde was reduced by %20 compared to the control sample.

Keywords: Cold plasma, Cumin, Essential oil, Colour changes.

Toxic Effects of cadmium on Essential Oil Composition, and expression of key genes involved in the biosynthesis of menthol and menthofuran in Peppermint (Mentha piperita L.)

Manije Sabokdast Nodehi*[a] Zeynab Azimychetabi[b], Taraneh Karami Moghadam[a]

[a] Department of Agronomy and Plant Breeding, College of Agriculture & Natural Resources, University of Tehran, Karaj, Iran

[b] Biology Department, Trent University, Peterborough, Canada

sabokdast@ut.ac.ir, zeynazimychetabi@trentu.ca, Karami.taraneh.m@ut.ac.ir

*Corresponding author: sabokdast@ut.ac.ir

Abstract

Cadmium is one of the heavy metals whose presence in soil induces oxidative stress in plants. This investigation was conducted to determine the modifications in the expression of key genes involved in the biosynthesis of Menthol and Menthofuran, two significant components of peppermint's essential oil, was measured. To the best of our knowledge, the expression of peppermint genes under heavy metals stress was measured for the first time in this research. The chemical composition of its essential oil, that makes peppermint a valuable herb, was also analyzed to determine the percentages of the principal constituents. Menthol content dropped and menthofuran concentration incremented by augmenting Cd together with pulegone. Increasing Cd amount in the soil was also followed by a reduction in the expression of *MR* and *PR* genes.

Keywords: Cadmium toxicity, Menthone reductase, Menthofuran synthase, Pulegone reductase, Menthol, Menthofuran

Ginkgo, its botany, Phytochemical compounds and medicinal effects

Azadeh mahmoudi, Bahram maleki zanjani and Ali ammarellou

1: Department of Genetics and Breeding, Faculty of Agriculture, University of Zanjan. Zanjan, Iran.
*Corresponding Author. E-Mail:ae.mahmoodi@yahoo.com

2: Department of Genetics and Breeding, Faculty of Agriculture, University of Zanjan. Zanjan, Iran.

3: Research Institute of Modern Biological Techniques, University of Zanjan, Zanjan, Iran.

Abstract

Ginkgo biloba is one of the valuable and important medicinal plants in many countries. Ginkgo can reproduce itself at the age of 30, and live up to 2500 year. The height of Ginkgo is up to 35 meters and the diameter is up to 7 meters, its leaves are fan-shaped. The phytochemical compounds in ginkgo extract can be documented to the three main categories: Flavone glycoside, Terpene lacton and Acids. In addition; other compounds are found in *ginkgo biloba* extract, which alone or in combination can help to control and treat many diseases, including alzheimer's, weight gain, high blood pressure and cardiovascular disease, diabetes, learning and concentration disorders, impotence, aging and some hearing problems. Based on knowledge, ginkgo extract is a powerful antioxidant that can remove free radicals and also stop their production process. Ginkgo extract is purified and prescribed in some countries, such as Germany. In this article, we have tried to introduce ginkgo botany, its effective compounds, and the mechanism of these compounds against diseases.

Keywords: Ginkgo, medicinal plants, Secondary metabolites.

Response of *chavicol O-methyltransferase* gene promoter of *Ocimum basilicum* to drought stress

Fatemeh Khakdan[1*], Athar Sadat Javanmard[2]

[1] Farzanegan Campus, Semnan University, Semnan, Iran

[2]Department of Biology, Faculty of Science, Yasouj University, Yasuj,Iran

Corresponding author Email: khakdan.biotech@gmail.com

Abstract

Methyl chavicol, a volatile phenylpropenes, is a part of defense system of *Ocimum* species. The final step in the biosynthesis of methyl chavicol is catalyzed by the chavicol O-methyltransferase (CVOMT) enzyme. Understanding the transcriptional regulation of the gene encoding this rate-limiting enzyme is an important key in metabolite engineering approaches. A 616 bp- upstream fragment of the *ObCVOMT* gene has been obtained from *Ocimum basilicum* genome using genome walking technology and cloned into the upstream of the β-glucuronidase (GUS) reporter gene to determine the GUS water stress-specific expression pattern. The transgenic tobacco showed that *pObCVOMT* drive GUS reporter gene special expression in different water stress levels. The in silico analysis of cis-acting elements also revealed *pObCVOMT* promoter contained transcription factor-binding sequences involved in transcriptional control in drought- or dehydration-response.

Keywords: chavicol O-methyltransferase gene, *Ocimum basilicum*, gene regulation, drought stress.

Effect of Salinity and Heat Stresses on physiological characteristics of medical plant Peppermint (Menthapiperita L.)

Azam Gholamnia - Asghar Mosleh Arani - Hamid Sodaeezade - Saeed Tarkesh Esfahani - Somaye Ghasemi

Abstract

The growth and yield of plants in the world particularly in arid and semi-arid regions are affected by salinity stress. In these regions, the effect of salinity stress intensifies by simultaneous drought caused by high temperatures. Investigating and obtaining the best growing conditions, which can lead to the production of plants with higher secondary metabolite contents, are among the most important goals in research on the cultivation of herbs. An experiment was carried out in order to study the effect of three levels of salinity (0, 60 and 120 mM of sodium chloride) and two levels of thermal stresses (25°C and 35°C) on some physiological characteristics *Mentha piperita L.* in a completely randomized design with three replications. The result showed that the temperature, salinity, time, and their interaction had

significant effects on changes in the levels of proline,, K^+/Na^+ ratio, soluble sugar at a 1% level ($P \leq 0.01$), by increasing salinity and heat stresses, the proline content increased by 1.92 times at 72 hours at a salinity of 120 mM compared to the control. Also, over time, sugar levels and K^+/N^+ ratio decreased with increasing temperature and salinity.

Keywords: Mentha piperita L., Salinity, heat, proline.

Effect of Salinity and Heat Stresses on C4H expression of medical plant Peppermint (Mentha piperita L.)

Azam Gholamnia - Asghar Mosleh Arani - Hamid Sodaeezade - Saeed Tarkesh Esfahani - Somaye Ghasemi

Abstract

Plants respond to stress by very different and complex physiological, genetic, biochemical, cellular, and molecular processes and adapt to environmental conditions. An experiment was carried out in order to study the effect of three levels of salinity (0, 60 and 120 mM of sodium chloride) and two levels of thermal stresses (25°C and 35°C) on *C4H* expression of medical plant Peppermint (Mentha piperita L.) in a completely randomized design with three replications. The result showed that the temperature, salinity, time, and their interaction had significant effects on changes in the levels C4H expression at a 1% level ($P \leq 0.01$), by increasing salinity and heat stresses, the highest rate *C4H* gene expression was observed at 72 hours and was 4.6 times.

Keywords: Mentha piperita L., C4H, Salinity, heat, medical plant.

Effect of Salinity and Heat Stresses on Rosmarinic Acid Content and Gene Expression in Peppermint (Mentha piperita L.)

Azam Gholamnia - Asghar Mosleh Arani - Hamid ṣodaeezade - Saeed Tarkesh Esfahani - Somaye Ghasemi

Abstract

Rosmarinic acid (RA) is a valuable medicinal compound which can be produce through the phenil propanoid biosynthesis pathway. An experiment was carried out in order to study the effect of three levels of salinity (0, 60 and 120 mM of sodium chloride) and two levels of thermal stresses (25°C and 35°C) on Rosmarinic Acid Content and expression of RAS gene in *Mentha piperita L.* in a completely randomized design with three replications. The result

showed that the temperature, salinity, time, and their interaction had significant effects on changes in the levels of Rosmarinic Acid Content and expression of *RAS* gene at a 1% level ($P \leq 0.01$), the Rosmarinic Acid Content and expression of RAS gene decreased with increasing temperature and salinity. The comparison of the corresponding treatments between 25˚C and 35˚C indicated that the simultaneous effect of salinity and temperature compared to the salinity stress resulted in a smaller reduction in the amount of rosmarinic acid.

Keywords: medicinal plant, *Mentha piperita* L., salinity, heat, real-time, Rosmarinic Acid.

A Review on Genetic Diversity and Molecular Identification of Iranian Native *Origanum sp.* Ecotypes and Cultivated Varieties Using DNA Markers

Sara Salesi[1], Saeed Tarkesh Esfahani[1]

Department of Arid Land and Desert Management, Collage of Natural Resources and Desert Studies,Yazd University, Yazd, Iran;Address: Collage of Natural Resources and Desert Studies, Yazd University, Safaeie, Yazd.

Abstract

Nowadays, the significance of medicinal plants and their role in achieving national self-sufficiency, and economic goals are visibly clear. Medicinal plants, as the valuable genetic resources, are one of the most important national wealth for any country. Plants of Lamiaceae family have always been considered as important genetic resources for plant breeding in biotechnology programs; mainly due to their great ecological flexibility as well as their adaptability to different climates. *Origanum* sp. is one of the most important and best-selling medicinal and spicy plants in the world because of antimicrobial and antioxidant properties in its extracts and essential oils. The utilization of molecular markers is becoming the preferred

method for genetic fingerprinting in biotechnology researches. Molecular markers are very operative in identifying the genetic diversity of related plants, especially when phenotypic markers are not able to detect it. They are more efficient and reliable than morphological markers because they are unlimited in number and less affected by growth conditions. Here we attempt to provide a literature review on the native varieties of *Origanum* and the use of DNA markers in identifying the intra- and inter- species genetic diversity within this genus in Iran.

Keywords: Medicinal plant, DNA marker, genetic fingerprinting, phylogenetic relations, Oregano, Marjoram

Study of the simultaneous effect of gamma and salicylic acid irradiation on the biochemical and physiological characteristics of fenugreek

Zahra Jafarzadeh - Ramin Hosseini - Behvar Asghari

Abstract

with nitrogen fixing bacteria and produce most of its required nitrogen. The purpose of this study was to investigate the simultaneous effect of gamma radiation and salicylic acid on the morphological, biochemical and genetic characteristics of fenugreek. In this study, fenugreek seeds were subjected to doses of 0, 10, 15 and 20 Gy of gamma rays. After plants reached the 4-leaf stage, they were sprayed with 1- and 3-mM salicylic acid solution for two weeks. The leaves were harvested before reaching the flowering stage. Methanolic extract was used to investigate the biochemical properties of the plants. The phenolic content of the extracts was measured using Folin-Ciocalteu method and using ELISA. Free radical scavenging activity of 2,2-diphenyl-1-pericylhydrazyl (DPPH) as well as total flavonoid content, total chlorophyll, total soluble protein and morphological characteristics of the plants (rate and percentage of germination, number of leaves per plant, stem length, RWC) were measured. Data were analyzed using SPSS 25 software according to the factorial experiment based on a completely randomized design. The results showed that the interaction of gamma radiation and salicylic acid was negative on plant height, stem diameter and the number of leaves and the highest values were observed in the control plants. Also, this interaction did not have a significant effect on the relative moisture content and total chlorophyll content, and the highest values were observed in the plant height and the main effect, when the 20 Gy dose of gamma radiation was applied. In dry weight, the amount of salicylic acid had the opposite effect, but with increasing dose to 15 Gy, an increase in the amount of dry matter was observed. The highest weight of plants was observed when the highest amount of salicylic acid was applied with the lowest dose of gamma radiation. The highest percentage and germination rate of fenugreek seeds was related to the control plants and 20 Gy Gamma dose, respectively. The amount of DPPH increased with increasing gamma and decreased with increasing salicylic acid, so that the highest amount was observed in the 20 Gy of gamma radiation and 0 mM of salicylic acid. The interaction of the treatments had a positive effect on the amount of flavonoids and the highest value was observed at 20 Gy of gamma radiation and 3 mM of salicylic acid. However, this interaction had an adverse effect on the amount of total phenol and the decrease in total phenol was observed with increasing gamma radiation dose. The highest amount of catalase enzyme was related to the interaction of the 15 Gy of Gamma and zero mM of salicylic

Keywords: fenugreek, gamma ray, silicic acid, biochemistry, phenol, flavonoids

Effect of harvest time on phytochemical characteristics of Momordica charantia

Mohkami, Z.[1*], Kheiry, A[2]., Sanikhani, M.[2]

[1] Research Instructor, Institute of Agricultural Research, University of Zabol, Zabol, Iran

[2] Assistant Professor, Department of Horticulture, Faculty of Agriculture, University of Zanjan, Zanjan, Iran

Abstract

Momordica charantia is an important medicinal plant of cucurbitaceae family. Momordica charantia has recently received growing attention due to its anti-diabetic compound in its immature fruits. It has other beneficial attributes such as hypoglycaemia, anti-carcinogenic, hyper cholesterolemic and Anti-tumor growth. It contains considerable amount of water, carbohydrates, protein, fat, minerals, vitamins and fiber. Fruits also contain charantin, momordicin, Vitamin C, nicotinic acid, P alanine, y-aminobutyric acid, aspartic acid, citrulline, glutamic acid, glutamine and other bioactive compounds. A field experiment was conducted to examine the effect of different stages of fruit maturity (1H, 2H, 3H and 4H) on the qualitative attributes of bitter melon (Vijay cultivar) during June to October 2018 in the Research farm of University of Zanjan, Iran. The results show that the highest amounts of total phenol (73.38 mg GA/g DW), total flavonoid (3.18 mg Q/g DW) and TSS (5.49 mg/l) was observed in 16 days after fruit set (4H). However, the highest amount of titerable acidity (TA) was obtained in 8 days after fruit set (2H). Although there were no significant effects between different harvest times on vitamin C and carbohydrates, but the maximum amount of vitamin C (24.86 mg/g DW) and carbohydrate (1.89 mg G/g DW) were recorded at stage 3H. As a result, harvesting fruits at different stages of maturity can display different bioactive compounds and phytochemical characteristics.

Keywords: bioactive compounds, diabetes, total phenol, total flavonoids, fruit maturity.

Effect of ripening stages on secondary metabolites accumulation *in Bitter gourd*

Mohkami, Z.[1*], Kheiry, A[2]., Sanikhani, M.[2]

[1] Research Instructor, Institute of Agricultural Research, University of Zabol, Zabol, Iran

[2] Assistant Professor, Department of Horticulture, Faculty of Agriculture, University of Zanjan, Zanjan, Iran

Abstract

Bitter gourd (*Momordica charantia* L.) is a medicinal plant belonging to Cucurbitaceae family and native to tropical and subtropical areas. In Asia, Bitter gourd is used as a medicine and food. Modern research has found that *Momordica charantia* L. has a good hypoglycemic activity. Chemical constituents isolated from Bitter gourd have manifested insulin-like effect or can promote the release of insulin, demonstrating the insulin-like properties. Isolated compounds such as insulin-like peptide (p-insulin), charantin, vicine, glycosides, karavilosides. Fruit and seed extract, juices and powders have demonstrated potential effects in lowering blood sugar by increasing glucose uptake and glycogen synthesis in the liver, muscles, and fat cells and activating insulin receptor substrate1 (IRS1) in skeletal muscle by tyrosine phosphorylation. A field experiment was conducted to examine the effect of different ripening stages (4, 8, 12 and 16 days after fruit set) on the secondary metabolites accumulation in bitter gourd (Vijay cultivar) during June to October 2018 in the Research farm of University of Zanjan, Iran. Momordicin and charantin amounts were measured by the High Performance Liquid Chromatography method (HPLC). There was significant effect between different ripening stages on momordicin and charantin at %5 probability level. The highest amount of momordicin was obtained at last ripening stage (18.67 mg/100 g DW) and lowest amount (5.90 mg/100 g DW) was observed in 4 days after fruit set. Similarly, the highest and lowest amounts of charantin was measured at 16 and 4 days after fruit set respectively (0.56 and 0.43 mg/ 100 g DW). The results of this experiment showed that late ripening stages after fruit set can improve the anti-diabetic compounds accumulation in Bitter gourd.

Keywords: antidiabetic, charantin, healthy compound, HPLC, momordicin, p-insulin

Endophytic fungi of medicinal plants as a treasure of bioactive compounds

Nahid Moarrefzadeh - Hadi Khateri

Abstract

Medicinal plants are rich biological sources of various bioactive compounds that are used around the world to treat various diseases. Despite the growing demand for these plants and the secondary metabolites derived from them, there are problems in addressing this need; On the one hand, a lot of plant material is needed to obtain a small amount of the bioactive material, and on the other hand, many species of medicinal plants are scarce or endangered due to reasons such as improper exploitation and destruction of their natural habitat by humans. Therefore, to meet the current therapeutic needs, it is necessary to look for new solutions to produce bioactive compounds of medicinal plants. Some endophytic fungi coexist with medicinal plants and have beneficial effects on their host plants, including improving their growth and health, increasing their tolerance to various biotic and abiotic stresses, and increasing the formation and accumulation of secondary metabolites by these plants. These endophytes may also produce a wide range of bioactive compounds and metabolites with diverse and important biological and medicinal activities that are same as or similar to their host plant compounds. They are therefore a valuable repository of new bioactive secondary metabolites that can be extracted and used in the pharmaceutical industry as an alternative source of plant use. It is clear that such a solution can not only prevent the extinction of certain medicinal plants, but can also be used to obtain and produce higher quality and quantity of medicinal plants. This review was written to clarify the importance of endophytic fungi in medicinal plants. Also, the biodiversity of fungal endophytes, some useful products and their secondary metabolites isolated from medicinal plants and the effect of some factors affecting the population structure of endophytic fungi have been mentioned. Various challenges for using endophytes as an alternative source of plant-derived bioactive compounds and their application in drug discovery have been also discussed.

Keywords: Phytochemicals, Secondary metabolites, Pharmaceutical, Drug discovery

Evaluation of yield and compatibility of some Iranian garlic (Allium sativum L.) cultivars in Zanjan, Iran

Ali Ammarellou[a], Ali Reza Yousefi[b], Moslem Heydari [b]

[b] Research Institute of Modern Biological Techniques, University of Zanjan, Iran,

[a] Department of Plant production and Genetics, University of Zanjan, Zanjan, Iran,

Abstract

The growth and yield characteristics of four garlic cultivars grown in Iran were analyzed under irrigation during 2015/2016 and 2016/2017. In this experiment, High-yielding and common garlic cultivars of Iran were evaluated that include Mouein, Tuyserkan, Taroom, and Heidareh. The germination rate of the Tuyserkan cultivar was more than the other cultivars. The dry weight and fresh weight of the Taroom cultivars were quite remarkable. Hence, the amount of fresh weight 22.7 ton ha^{-1} and dry weight 12.1 ton ha^{-1} was obtained in the Tarom cultivar. Stem diameter (d), and the number of leaves (nL) were also, more affected in the Tarom cultivar in both of the years. However, on average the tallest plants (h) were observed in the Heidareh cultivar during the experiments. Although the growth, development, and yield of plants are highly dependent on their genetic characteristics, however, cultivar of Taroom showed very good yield (12.1 ton ha-1) and improved the evaluated characteristics compared to other cultivars which can be due to the high compatibility of this cultivar to environmental conditions. Due to the fact that dry weight, fresh weight, and stem diameter are very important indexes in the evaluation of garlic yield, so based on the results obtained, it could be concluded that the Taroom cultivar has a significant advantage over other cultivars.

Keywords: Compatibility, garlic, medicinal plant, performance

Optimization of hairy root induction in *Catharanthus roseus* medicinal plant by different strains of *Agrobacterium rhizogenes*

Syavash Hemmaty, Ahad Hedayati

Academic Center for Education, Culture and Research (ACECR), West Azarbayjan Branch, Urmia, Iran

* e-mail:syavash.hort@gmail.com

Abstract

Catharanthus roseus is a medicinal plant belonging to the family Apocynaceae which produces terpenoid indole alkaloids of high medicinal importance.The development of genetically transformed plant tissue cultures and mainly of roots transformed by *Agrobacterium rhizogenes*, is a key step in the use of *in vitro* cultures for the production of secondary metabolites. Hairy root induction is the result of the infection of plant tissues with *A. rhizogenes* and subsequently integration of root induction plasmid T-DNA into the plant genome and its subsequent expression. Many strains of A. *rhizogenes* exist and have been used for plant transformation. In this study, the effect of three strains of *A. rhizogenes* (A4, A7 and A13) and two explants type (leaf and stem) on hairy root induction in *C. roseus* were investigated. The results showed that in leaf explants, maximum hairy roots induction (65%) was obtained in explants that infected with *A. rhizogenes* A4 strain. While, in A7 and A13 strains 25% and 13%, respectively, hairy root induction was observed. Also, according to the results, in stem explants, different strains of *A. rhizogenes* were not able to produce hairy roots. The selection of an effective *Agrobacterium* strain for the production of transformed root cultures significantly depends on the plant species and must be determined empirically. The differences in virulence, morphology, and growth rate are at least partially related to the variety of Ri (root inducing)-plasmids within each bacterial strain.

Keywords: *Agrobacterium rhizogenes*is, Bacteria strains, *Catharanthus roseus*, Explant, Hairy root

The effect of allicin in garlic extract on the viability of gastric cancer cell line (AGS)

Danesh Hekmati R[1], BarzegarA[1,2], Farzaneh p[3]

[1] Sana Institute of Higher education, Sari, Iran
[2] Department of Basic Sciences, Sari Agricultural Sciences and Natural Resources University, Sari, Iran
[3] Iranian Biological Resource Center, Tehran, Iran
rezvandhk@gmail.com

Abstract

Background and Aim: Various studies show that plant extracts can have cytotoxic effects on cancer cells. The aim of these studies was to investigate the effect of allicin in garlic extract on the survival of gastric cancer cells in culture medium. material and methods: In this experiment, two cell lines were used. One of them is a cancer cell line (AGS) that was cultured in DMEM / F 12medium containing %10 Fetal bovine serum and the other one is a healthy cell line (HuGu) that was cultured in DMEM / F 12medium containing %15fetal bovine serum and 2Percent of MEM medium and stored in an incubator at 37° C and %5CO 2pressure. then the cell lines were randomly divided to control and exposed groups of 5, 4, 3, 2, 1, 0.6, 0.4, 0.2, 0.1, 0.08.0.04, 0.02, and 0.01mg/ml of allicin in garlic extract to determine cell viability by using MTT assay. In the end, data were analyzed by one-way analysis of variance.

Results: The survival of the AGS cell line was significantly different between the control group and different doses of allicin and the survival of a healthy cell line (HuGu) was higher than that of the cancer cell line.

Conclusion: The results showed that allicin affects the survival of the cancer cell line and causes the destruction of cancer cells.

Keywords: Allicin ،garlic extract ،viability ،gastric cancer ،AGS

The effect of allicin in garlic extract on BAX and Bcl2 gene expression in gastric cancer cell line (AGS)

Danesh Hekmati R[1], BarzegarA[1,2], Farzaneh p[3]

[1] Sana Institute of Higher education, Sari, Iran
[2] Department of Basic Sciences, Sari Agricultural Sciences and Natural Resources University, Sari, Iran
[3] Iranian Biological Resource Center, Tehran, Iran
rezvandhk@gmail.com

Abstract

Background and Aim: Gastric cancer is the fourth most common cancer in men and the fifth most common cancer in women, and approximately two-thirds of it is in developing countries. it happens. In cancer, the balance between cell proliferation and apoptosis is disturbed, resulting in a direct link between the expression of BAX and BCL2 genes and There is a process of becoming cancerous. This study aims to determine the extent to which the expression of these genes changes in the allicin-treated gastric cancer cell line. Methods: In this experiment, two cancer cell lines (AGS) were used in DMEM / F12 medium containing 10% fetal bovine serum. And normal cell line (HuGu) cultured in DMEM / F12 medium containing 15% fetal bovine serum and 2% MEM culture medium Were stored in an incubator at 37 ° C and 5% CO2. Then the expression of the GAPDH gene as control and BAX and Bcl2 were analyzed and the data were obtained using SPSS statistical software and ANOVA and T_Test statistical tests. Was analyzed

Results: The dose of allicin used in this experiment had no significant effect on the expression of BAX and Bcl2 genes in two normal and cancerous samples. While decreasing BAX gene expression and increasing Bcl2 expression were expected

Conclusion: According to previous research and the present study, allicin may be more effective at higher doses

Keywords: AGS, HuGu, gastric cancer, allicin, garlic extract, BAX, BCL-2, gene expression, RT-PCR

Hairy root Induction in *Nicotiana tabacum* L.

Farzaneh Ramezani*[1], Reza AmiriFahliani [2] and Asad Masoumiasl [3]

[1]MSc. student, Department of Agronomy and Plant Breeding, Faculty of Agriculture, Yasouj University, Yasouj, Iran

[2]Assistant Professor, Department of Agronomy and Plant Breeding, Faculty of Agriculture, Yasouj University, Yasouj, Iran

[3]Associate Professor, Department of Agronomy and Plant Breeding, Faculty of Agriculture, Yasouj University, Yasouj, Iran

*Corresponding author: farzaneh.ramezani1396@gmail.com

Abstract

Plants produce a large and diverse group of organic compounds called secondary metabolites. Such a compounds synthesized with a low rate in plants and they usually accumulated in differentiated tissues. Tissue culture technique is being considered as an alternative technique for agricultural processes for production of valuable secondary metabolites. Hairy root culture is the most promising system for the production of these valuable compounds. for this, the induction of hairy root in tobacco (*Nicotiana tabacum* L.) was performed using two *Agrobacterium rhizogenesis* strains including 15834 and R1000. The effect of explant type (leaves and petioles) and bacterial density (OD_{600nm}= 0.2, 0.4 and 0.6) were evaluated based on factorial experiments in a completely randomized design with three replications. The results showed that the highest percentage of transgenics for both strains is related to leaf explants and different densities of bacteria do not have a significant effect on hairy root induction. The present study showed that both the two strains induced hairy roots in tobacco.

Keywords: Hairy root culture, explant, *Agrobacterium rhizogenesis*, Transgenic, *Nicotiana tabacum* L.

Evaluation of the effect of Thymus vulgaris oil on growth and pathogenetic mechanisms of Fusarium oxysporum

Nima Khaledi[1*]

[1*]Seed and Plant Certification and Registration Research Institute, Agricultural Research, Education and Extension Organization (AREEO), Karaj, Iran

[*]n_khaledi@areeo.ac.ir

Abstract

Medicinal plants are potential sources of antimicrobial compounds, which could be used in the management of plant diseases. Research on plant extracts and essential oils which may substitute the use of agrochemical or which may contributes to the development of new compounds is extremely important. Essential oils are promising alternative compounds which have an inhibitory activity on the growth of pathogens. Application of essential oils is a very attractive method for controlling plant diseases. The Fusarium wilt caused by *Fusarium oxysporum* can be prevented through growing resistant cultivars, soil and seed disinfection by some chemicals. Recently the essential oils as a new method and replace for the control of plant diseases have been accepted. In this study the effect of essential oil of *Thymus vulgaris* was prepared by using a Clevenger apparatus and its antifungal effect on *F. oxysporum* was investigated in the laboratory based on mixing essential oil with medium with four replicates. Evaluation of essential oil antifungal was tested at different concentrations of essential oils (i.e. 0-2000 ppm). Growth rate decreases with increasing concentration. No growth was observed at concentrations of more than 1000 ppm. In section survey of enzyme activity, the essential oil reduces cellulase activity but over time, the effect of essential oil decreased. The results of this evaluation of indicate that compounds found in essential oil to reduce fungal growth and enzyme activity. Considering that the production of cellulase enzyme is one of the most important mechanisms influencing penetration to the host, thus reducing the amount of secreted enzymes indicates effect of essential oil on the pathogenic mechanisms and production of cellulase gene expression. These results indicate that essential oils after suitable formulation could be used for the control of Fusarium wilt caused by *F. oxysporum* pathogen.

Keywords: *Fusarium oxysporum*, *Thymus vulgaris*, essential oil, cellulase.

Vestigation of explant and plant growth regulators on callogenesis, Indirect shoot Regeneration and shoot rooting in Echinacea Purpurea L

Asghar Arab Asadi,[1*] Shahrokh Gharanjik,[2] Mohammad Reza Amerian[3], Mehdi Rahimi[4], Hassan Ghorbani Ghujdi[5]

1- master degree biotechnology of Agricultural, University of Technology Shahrood, Iran
koorush_1358@yahoo.com
2- Assistance Professor, Faculty of Agricultural, University of Technology Shahrood, Iran
gharanjik.sh@gmail.com

Abstract

Echinacea purpurea L. (purple coneflower), a medicinal plant commonly used in the treatment of colds, flu, related ailments and stimulate the immune system. In vitro propagation is a suitable response to increase the demand for this medicinal plant and indirect regeneration is one of the useful methods for plant propagation. The effects of explant (leaf and petiole) and different concentrations 6-benzylaminopurine(BAP) and Thidiazuron (TDZ) alone or combination with naphthalene acetic acid (NAA) and indole-3-butyric acid (IBA) on callus induction as well as the effect of explant (leaf and petiole) and 2mg/l BAP hormone on the indirect shoot regeneration of callus were evaluated in two separated experiments. The effects of IBA or NAA on shoot rooting were investigated. The study were conducted as factorial in a completely randomized design (CRD). The results indicated that highest callogenesis were obtained using different concentrations TDZ and IBA. The highest shooting (92/85 %) was obtained from the leaf explant and by use of BAP (2 mg/l) and NAA (0.1 mg/l). high rooting was achieved using MS media supplemented with NAA. Highest number root per explant (8/16) was achieved using MS media supplemented with 0/5 mg/l NAA. The good potential of this species for indirect shoot regeneration was shown in this research can be used in micropropagation programs , gene transferand and transgenic plants production

Keywords: Callogenesis, *Echinacea pupurea*, rooting, shooting, regeneration

Evaluation of the effect of *Thymus vulgaris* oil on growth and fungal biomass of *Rhizoctonia solani*

Nima Khaledi[1*]

[1*]Seed and Plant Certification and Registration Research Institute, Agricultural Research, Education and Extension Organization (AREEO), Karaj, Iran

[*]n_khaledi@areeo.ac.ir

Abstract

In the present study, we evaluated the antifungal activity essential oil of *Thymus vulgaris* against *Rhizoctonia solani* as important pathogen on tomato plants. The *T. vulgaris* EO was extracted using a Clevenger apparatus. A total of thirteen compounds, representing 98.6 % of the oil were identified by gas chromatography-mass spectrometry (GC-MS). The main components of thyme oil were included thymol (48.9 %), *p*-cymene (15.8 %), borneol (8.1 %), γ-terpinene (5.7 %), isoborneol (3.7 %) and 4-terpineol (3.2 %) that identified by gas chromatography-mass spectroscopy. The minimum inhibitory concentration (MIC) values obtained for thyme oil was considerably lower than the values obtained for synthetic fungicides such as Thiabendazole and Tebuconazole. The results of this evaluation of indicate that a compound found in thyme oil was effective in reducing growth and fungal biomass. These results indicate that thyme oil after suitable formulation could be used for the control of soil-borne fungal pathogens of tomato, especially *Rhizoctonia solani* are common in many parts of the world.

Keywords: Biomass, Essential oil, *Rhizoctonia solani*, Thiabendazole, *Thymus vulgaris*.

First report of *Alternaria alternata* associated with seed of Asafetida (*Ferula assa-foetida*)

Nima Khaledi[1*], Farshid Hassani[1]

[1*]Seed and Plant Certification and Registration Research Institute, Agricultural Research, Education and Extension Organization (AREEO), Karaj, Iran

[*]n_khaledi@areeo.ac.ir

Abstract

Alternaria is considered one of the most common saprophytic fungi as well as is recognized as pathogens of various plant parts including seed. In May 2020, chlorosis and blight symptoms observed on seedlings emerging from seeds of Asafetida (*Ferula assa-foetida*). Using the agar plate test, a total of 19 fungal isolates were isolated from seed samples collected from different Asafetida growing regions of Iran. Based on morphological and molecular characteristics, all the isolates was identified as *Alternaria alternata*. Pathogenicity tests were conducted and Koch's postulates were fulfilled by re-isolation of the identified fungus. This is the first report on isolation and identification of *A. alternata* associated with seed of Asafetida in world.

Keywords: *Alternaria alternata*, Asafetida, Germination test, Pathogenicity, Seed-borne.

The Effects of Chitosan and Salicylic acid On Elicitation Of Secondary Metabolites in Callus culture of *Matricaria chamomilla*

Shima Alaei[1],Sara Sharifi[1]*,Lia Shooshtari[1]

[1]Plant Biotechnology Research Center, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran

sarah.sharifi.59@gmail.com

Abstract

Matricarai chamomilla is one of valuable medicinal plant. Matricaria shows different pharmacological activities like anti-inflammatory, anti cancer, treatment of stress and depression, anti allergic. More than 120 chemical constituents have been identified in Chamomilla as secondary metabolites such as terpenoids, flavonoids, cumarins and polyacetylenes.This study investigated the effect of different concentrations of two elicitors, chitosan (10, 20, 30 mg/L) and Salicylic acid (10, 20, 30 mg/L) on production of secondary metabolites. The highest content of flavonoids and anthocyanin were observed under elicitation respectively by (30mg/L) and (20 mg/L) salicylic acid for secondary production of Matricaria chamomilla.This indicated superiority of salicylic acid for production of secondary metabolite.

Keywords:Elicitors, *Matricaria chamomilla*, Secondary Metabolites

A review of the importance of Taxol production from yew (Taxus baccata L.)

Gorzi, R[1]. Kheiry, A[2]. Angourani, H[3]

[1]Raheleh gorzi, Ph.D student , Department of Horticultural Sciences, Faculty of Agriculture, University of Zanjan, Zanjan, E-Mail: rahil.gorzi@gmail.com

[2]Azizollah Kheiry, Assistant professor Department of Horticultural Sciences, Faculty of Agriculture, University of Zanjan, Zanjan, E-Mail: kheiry@znu.ac.ir

[3]Hossein Rabbi Angourani, Assistant Professor Research Institue of Modern Biological Techniques, University of Zanjan, Zanjan, E-Mail:rabbihosein@gmail.com

Abstract

The medicinal value of the yew plant, especially *T. baccata*, is due to the presence of Paclitaxel under the brand name Taxol in its needle leaves. Taxol, with its antimicrobial properties, causes the death of proliferating cells by preventing the formation of abnormally dividing spindles. Abnormal division stops DNA transcription in the G2 / M division of mitosis and thus causes the proliferation of proliferating cells. Obtained for the first time from the yew plant. The yew tree with the scientific name of *Taxus baccata* L. is one of the coniferous trees of the plant belonging to the Taxaceae family. The yew forests are among the oldest forests in the world and are the heritage of the late third geological period. The yew is an endangered and regenerative plant. And it grows naturally very little. This tree is shade-loving and is distributed in humid and semi-humid areas and its distribution is in the forests of northern Iran. The use of this plant is the treatment of cancer, especially breast, uterine and ovarian cancers, which is related to the composition of taxol. It is a type of alkaloid diterpene that is one of the most effective chemotherapeutic drugs and is on the list of essential drugs of the World Health Organization. This substance is extracted from the skin, roots and other parts of the plant and is still extracted. Valuable plant source has retained its importance and status. Production of taxol through biotechnologies is one of the main options used and has advantages such as independence of production from geographical and environmental conditions, higher production speed and ease of extraction and prevention of extinction of native resources with a positive approach to increase the effective material.

Keywords: *Taxus Baccata*, alkaloid, Taxol, Anti Cancer

Investigation of the presence of flavonoids in fungal endophytes associated with *Capparis spinosa* L. by HPLC method

Mohsen Rajabi[1*2], Mohammad Reza Azimi Moghadam[1], Ali Azizi[3], Jalal Soltani[4]

1. Department of Plant Production and Genetics, Faculty of Agriculture, University of Zanjan, Zanjan, Iran.
2. Natural Resources Department, Hamedan Agricultural and Natural Resources Research and Education Center, AREEO, Hamedan, Iran.
3. Department of Horticulture, Faculty of Agriculture, Bu Ali Sina University, Hamadan, Iran.
4. Department of Plant Protection, section Phytopathology, Faculty of Agriculture, Bu Ali Sina University, Hamadan, Iran.

*Corresponding author m.rajabi@znu.ac.ir

Abstract

Endophytic fungi are defined as fungi that spend their whole or a part of their lifecycles within plants without causing overt disease symptoms, even though during senescence of their host plants or during severe stress conditions endophytes may also turn parasitic. Flavonoids are a diverse group of polyphenolic compounds among secondary metabolites found naturally in different organs of plants, and more than 4,000 different types of them have been identified in plants. Rutin, Quercetin and Apigenin are also of the flavonoids belonging to flavonols that are used as a reagent in the study of flavonoids and are an antioxidant. In this phytochemical study, High Performance Liquid Chromatography (HPLC) method was used to detect Rutin, Quercetin and Apigenin in 24 fungal endophytes associated with *Capparis spinosa* collected from different areas. Results showed that retention time was 3.82, 7.60 and 12.40 for Rutin, Quercetin and Apigenin, respectively and Rf values were 0.189×10^{-4} , 0.267×10^{-4} and 0.215×10^{-4}, respectively. Also, results showed from all fungal endophytic isolates, only 3 isolates showed containing Rutin. Molecular detection based on ITS gene showed these fungi were *Paecilomyces maximus*, *Penicillium chrysogenum* and *Alternaria destruens* that isolated from Khodaafarin (East Azarbaijan Pro.), Asadabad (Hamedan Pro.) and Ahvaz (Khuzestan Pro.) areas and showed Rutin containing about 3.34, 0.34 and 22.61 ppm, respectively. Also, these fungi were recovered from leaf, root and fruit of *Capparis spinosa*, respectively. None of them had Quercetin and Apigenin. This finding is the first record of Endophytic fungi producing Rutin form *Capparis spinosa* and can be used in pharmaceutical and medical industries.

Keywords: Flavonoid, Endophytic fungi, *Capparis spinosa*

Study of oxidative stress and cell death in *Nicotiana tabacum* cell suspension exposed to zinc oxide nanoparticles

Maryam Mazaheri-Tirani [a*] and Soleyman Dayani [b]

[a] Department of Biology, Faculty of Science, University of Jiroft, Jiroft 78671-61167, Iran
https://orcid.org/0000-0003-4643-8967

[b] Department of Agricultural Biotechnology, Payame Noor University (PNU), P.O. Box 19395-4697 Tehran, Iran, https://orcid.org/0000-0002-8639-7867
*Corresponding author: Tel.: +98(0) 3443260061; Fax: +98(0) 3443260065.
mazaheri@ujiroft.ac.ir

Abstract

This study, first, evaluated different levels of NAA and KIN on *Nicotiana tabacum* callus induction from leaf explant. Two mg L^{-1} NAA with 0.1 mg L^{-1} KIN on Murashige and Skoog (MS) medium induced callus in explants. Then this level of NAA and Ki was used in cell suspension culture. Finally, the effects of different concentrations of nP-ZnO (0.06, 0.12, 0.24 mM) compared to $ZnSO_4$ (0.03 mM; control) on cell toxicity in suspension culture were investigated. Zinc cell content was increased in suspension culture under ZnO NPs compared with $ZnSO_4$, which was positively correlated with protein content. The ZnO NPs induced cell death more significantly than control. The oxidative stress induced higher negative effects at a concentration of 0.024 mM ZnO. SOD enzyme activity increased at all levels of ZnO. H_2O_2 decreased at concentrations lower than 0.12 mM nP-ZnO compared to control. The results showed that ZnO NPs more significantly induced cell death and stress-induction effect in tobacco cells in suspension culture.

Keywords: Heavy metals, ZnO, oxidative stress, toxicity, Tobacco, seedlings survival, cell culture

The effect of biochar application and root inoculation with arbuscular mycorrhizal fungus on growth and yield of *Aloe vera*

Saeid hazrati[a], Saba mohebi[a], Hamid mohammadi[a] and Saeed mollaei[b]

[a]Faculty of Agriculture, Azarbaijan Shahid Madani University, Tabriz, Iran.

[b]Phytochemical Laboratory, Department of Chemistry, Faculty of Sciences, Azarbaijan Shahid Madani University, Tabriz, Iran

Abstract

Aloe vera is an important medicinal plant with high economic value in the world, which is widely used in various industries such as pharmaceutical, cosmetic and food. In order to investigate the effect of simultaneous application of biochar and arbuscular mycorrhizal fungus on growth, yield and aloin latex of *A. vera* at two harvest a factorial experiment with six replications was conducted. Experimental factors included three levels of biochar (without biochar (control), 250 and 500 g per pot) and two levels of arbuscular mycorrhiza (non inoculation and inoculation). According to the results at both harvest times, mycorrhiza inoculation had the greatest additive effect on the different characteristics compared to other treatments. Then, application of 250 g of biochar along with inoculation with mycorrhiza improved the growth and yield of *A.vera.* Inoculation with mycorrhiza and its additive effect on morphological traits such as number of leaves 15.00 and 17.75 per plan, leaf length 59.62 and 65.00 cm, leaf width 7.29 and 8.14 cm, leaf thickness 3.70 and 3.95 cm, plant height 35.75 and 74.00 cm in the first and second harvest, respectively, as well as plant yield such as number of pups 13.75 and 25.00 per plant , leaf weight 239.67 and 330.43 g, root fresh weight of 275.74 and gel to peel ratio 3.15 and 3.71 were obtained in the first and second harvest, respectively. The highest amount of aloin latex at two harvest times were 3.50 and 8.66 g with inoculation. In *A. vera*, leaf yield and gel production as well as increasing aloin synthesis are important considering the preservation and improvement of soil properties; Therefore, according to the results, inoculation with mycorrhiza can be effective to achieve the highest yield and growth of the *A. vera*. Also, the application of high amounts of biochar for the *A. vera* is not recommended.

Keywords: *Aloe vera*, Aloin, Biochar, mycorrhiza, Yield

Green root fabrication and chitosan encapsulation of Cerium Oxide Nanoparticles as antibacterial agent

Nosheen Akhter
Department of Biotechnology Faculty of Biological Sciences Alzahra University Iran Tehran
Dr.Parichehr Hanachu
Department of Biotechnology Faculty of Biological Sciences Alzahra University Iran Tehran

Abstract

Green synthesis method is gaining recognition for the production of Cerium nanoparticles (Ce-NPs) due to their multiple applications. The most important applications of CeNPs used, as an anti-bacterial agent. The use of plant in the synthesis of nanoparticles emerges as a cost effective and eco-friendly approach. In the present study, *Arctium lappa l.* root was used to synthesize Cerium nanoparticles (Ce NPs). These were encapsulated with nano-chitosan by sol gel method. The plant *Arctium lappa l.* contain following active reagents (Ethanol, Acetone, 1.Propanol, 1-Propanol, 2methy- , Ethane, 1,1, diethoxy , 1-Butanol,3-methyl- ,Oleic Acid) elements act as a reducing agent for the synthesis of CeO_2NPs. NPs produced were analyzed by Fourier transform-IR spectroscopy shows the functional group of Ce-O and Chitosan (Cs) encapsulated Ce shows the C-O-C stretching bond. X-ray diffraction analysis SEM and EDX techniques were also used to morphologically investigate the particles' crystal structure and purity of sample. Staphylococcus aureus and Pseudomonas aeruginosa were utilized to evaluate the antibacterial activity of the CeNPs. SEM showed the formation of Ce NPs mono dispersed within the size range of 20.08 nm. X-ray diffraction analysis showed that the cubic crystalline structure of the nanoparticles having size of 28 nm. After encapsulation by chitosan nanoparticles the size of CeO_2NPs enhances to 56 nm thus making average of about 28 nm. The results of the disc diffusion test used for measuring the anti-bacterial activity of the synthesized Cerium nanoparticles indicated that the formed nanoparticles possessed a suitable anti-bacterial activity. The more interestingly our results of Encapsulated Cerium Oxide nanoparticles enhance the antibacterial activity against all the test strains in comparison with pure CeO_2NPs. Biologically synthesized cerium oxide nanoparticles can be used in pharmaceutical industry to combat MDR strains.

Keywords: Cerium oxide nanoparticles, Green synthesis, *Arctium lappa l.*, Chitosan encapsulation, Novel synthesis, Antimicrobial activity.

Effect of isolated polysaccharide from Rosa canina on the methylation of insulin and Pax4 in diabetic rats

Soraya Sajadimajd[1*]; Gholamreza Bahrami[2]

[1] Department of Biology, Faculty of Science, Razi University, Kermanshah, Iran. Email: sajadi.s62@gmail.com

[2] Medical Biology Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran. Email: g_bahrami1339@yahoo.com

Abstract

Introduction: Since DNA methylation plays a causal role in β-cell remodeling and development, thus modulation of this epigenetic mechanism is essential in treatment of diabetes. Therefore, this provoked us to examine the effect of a known anti-diabetic agent, an isolated polysaccharide, on the methylation pattern of Ins-1 and Pax-4 in diabetic rats. Materials: Here, a polysaccharide fraction was isolated from *Rosa canina* and analyzed using NMR, FTIR and MS/MS techniques. Diabetes was established by using intraperitoneal injection of STZ in male Wistar rats. After treatment, pancreas was removed and DNA was extracted and bisulfite treated by a DNA methylation kit. PCR and real-time PCR were used to determine the levels of methylated and/or unmethylated Ins-1 and Pax-4 genes.

Results: The levels of blood glucose and weight body were normalized in diabetic rats exposed to isolated polysaccharide. The level of unmethylated Ins-1 was upregulated in diabetic rats which is downregulated in metformin and polysaccharide-treated ones. In diabetic rats, the content of methylated Pax-4 was increased while it was decreased in polysaccharide-treated group. Interestingly, the methylation pattern of Pax-4 in metformin group was the same as diabetic ones.

Conclusion: Data clearly indicated that polysaccharide can reduce the level of blood glucose by modulating the methylation pattern of Pax-4 and Ins-1. This study sheds light on the importance of DNA methylation modulation as a promising therapeutic strategy in diabetes.

Keywords: Diabetes, DNA methylation, Polysaccharide, *Rosa canina*

Antimicrobial impacts of methanolic extract of *Cyanobacteria* isolated from Iran's Lake Urmia

Hamieh Goshtasbi[1,2], Azam Safary[3,1], Mostafa Akbarzadeh-Khiavi[4,1], Ali Movafeghi[2], Yadollah Omidi[5]

[1] Research Center for Pharmaceutical Nanotechnology, Biomedicine Institute, Tabriz University of Medical Sciences, Tabriz, Iran.

[2] Department of Plant Biology, Faculty of Natural Science, University of Tabriz, Tabriz, Iran.

[3] Connective Tissue Diseases Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.

[4] Liver and Gastrointestinal Diseases Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.

[5] College of Pharmacy, Nova Southeastern University, Fort Lauderdale, FL, USA.

Abstract

Cyanobacteria, as a rich source of bioactive compounds, has been potentially considered for biomedical and pharmaceutical applications. In the present study, isolation and identification of *Chroococcus turgidus* were performed from the south of Lake Urmia. The crude metabolites were extracted from *Ch. turgidus* biomass according to the soxhlet method using methanol. The methanol extract (ME) were concentrated in a rotary evaporator, followed by removing the traces of solvent with the desiccator. The disk diffusion and broth microdilution methods were used to determine the antimicrobial effects and the minimum inhibitory concentration, respectively. According to the inhibition zone, the ME showed a significant effect on the *Enterobacteriaceae* family, which are commonly involved in different gastrointestinal infections. In conclusion, the *Ch. turgidus* extract can introduce various compounds as suitable candidates for developing new antimicrobial agents.

Keywords: Antimicrobial effect, *Chroococcus turgidus*, *Enterobacteriaceae*, Methanol extract

In vitro anticancer activity of methanolic extract of *Chroococcus sp.*, from Kani Barazan International Wetland

Hamieh Goshtasbi[1,2], Mostafa Akbarzadeh-Khiavi[3,1], Azam Safary[4,1], Ali Movafeghi[2], Yadollah Omidi[5]

[1] Research Center for Pharmaceutical Nanotechnology, Biomedicine Institute, Tabriz University of Medical Sciences, Tabriz, Iran.

[2] Department of Plant Biology, Faculty of Natural Science, University of Tabriz, Tabriz, Iran.

[3] Liver and Gastrointestinal Diseases Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.

[4] Connective Tissue Diseases Research Center, Tabriz University of Medical Sciences, Tabriz, Iran.

[5] College of Pharmacy, Nova Southeastern University, Fort Lauderdale, FL, USA.

Abstract

The current bioprospecting study has been conducted to develop the new anticancer agents with higher efficiency of microalgae isolated from the Kani Barazan International Wetland in the south of Lake Urmia. Microalgae as one of the large and diverse groups of autotrophic organisms are able to use in different biomedical sources due to their antioxidant and anticancer properties. In this study, biological impacts (DPPH radical scavenging, MTT assay, Annexin VP/I, and cell cycle) of methanolic extract (ME) from *Chroococcus turgidusa* were evaluated against colorectal and gastric cancer cells. Based on our result, the ME can significantly inhibit cell proliferation and induce apoptosis in SW480 and AGS cell lines. Conclusively, the ME of *Ch. turgidusa* can be presented as a potential preventive/therapeutic agent in gastrointestinal cancers. To the best of our knowledge there is no scientific published data about *Ch. turgidusa* anticancer effects.

Keywords: Anticancer activity, Antioxidant capacity, Apoptosis, *Chroococcus turgidusa*, Methanolic extract

Application of medicinal plants for production of cold beverages

Fatemeh Bayat, Mandana Bimakr, Ali Ganjloo, Mohsen Zandi

[1] B.Sc student, Department of Food Science and Engineering, University of Zanjan, Zanjan, Iran

[2]Associate Professor, Department of Food Science and Engineering, Faculty of Agriculture, University of Zanjan, Zanjan, Iran

[3] Assistant Professor, Department of Food Science and Engineering, Faculty of Agriculture, University of Zanjan, Zanjan, Iran

Abstract

Medicinal plants as a valuable natural resource contain a wide range of secondary metabolites which could be used in the production of various types of drugs, flavors, fragrances, dyes, pesticides and food products such as beverages. According to the historical evidence plants have been the first and most available sources for the treatment of different diseases. Nowadays, the medicinal and health promoting effects of medicinal plants on human health have been widely studied. The consumption of herbal beverages as part of a balanced diet may improve the consumer health. Herbal teas and beverages are rich sources of natural bioactive compounds such as carotenoids, phenols, flavonoids, coumarins and anthocyanins. Various studies have shown that these compounds possess antioxidant, anti-radical, antimicrobial, anti-carcinogenic and anti-inflammatory activities which could have significant effects on human health. In this study, an overview of bioactive compounds was presented. Furthermore, an introduction of common medicinal plants for the production of cold beverages was discussed.

Keywords: Medicinal plants, beverage, bioactive compounds, functional, Health promoting

Protective effect of an isolated polysaccharide from *Rosa canina* in STZ-treated Rin5-F cell line through modulation of cell cycle

Soraya Sajadimajd[1*]; Gholamreza Bahrami[2], Bahareh Mohammadi[2], Alireza Farokhi[2]

[1] Department of Biology, Faculty of Science, Razi University, Kermanshah, Iran. Email: sajadi.s62@gmail.com

[2] Medical Biology Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran. Email: g_bahrami1339@yahoo.com; baharbmk2010@yahoo.com; alireza.farokhi@kums.ac.ir

Abstract:

Polysaccharide isolated from medicinal herbs plays an essential role in treatment of metabolic diseases including diabetes. To understand the underlying molecular mechanism of isolated polysaccharide from *Rosa canina*, modulation of cell cycle was evaluated in a diabetic model, STZ-treated Rin5-F cell line. Herein, polysaccharide was extracted from *Rosa canina* and evaluated by using infrared radiation (IR), high-performance liquid chromatography diode array detector tandem mass spectroscopy (HPLC-DAD MS/MS) and nuclear magnetic chromatography (NMR) systems. Rin-5F cells were treated with STZ and isolated polysaccharide alone and in combination. The viability of the cells, cell cycle and the expression of Bax, Bcl2 and cyclin d1 were analyzed using MTT assay, flow cytometry and qRT-PCR, and western blotting respectively. Polysaccharide increased the viability of Rin5-F cells exposed upon STZ as post and pre-treatments. Cell cycle analyses indicated the protective effect of isolated polysaccharide through scale down in the sub G1 phase and scale up in S phase. The ratio of Bax/Bcl2 was decreased while the expression of cyclin d1 increased in STZ and polysaccharide co-treated-Rin5-F cells compared to STZ-treated cells. The results indicated that the protective effects of isolated polysaccharide was mediated by the modulation of cell cycle and it is expected that the results paved the way to speculate novel anti-diabetic strategies.

Keywords: Polysaccharide, Rin5-F cells, Cell cycle, Bax, Bcl2, cyclin d1

Evaluation of Rosa damascena Mill. Phytochemical Compounds Effect on Phosphodiesterase-5 Inhibition in Order to Improve Erectile Dysfunction: an in silico study

Mahnaz Ghowsi[1] and Farshad Qalekhani[2, 3*]

[1] Department of Biology, Faculty of Sciences, Razi University, Kermanshah, Iran.
[2] Pharmaceutical Sciences Research Center, Health Technologies Institute, Kermanshah University of Medical Sciences (KUMS), Kermanshah, Iran.
[3] Medical Biology Research Center, Health Technologies Institute, Kermanshah University of Medical Sciences (KUMS), Kermanshah, Iran.

*Email: qalekhani.farshad@gmail.com

Abstract

Penile erection is a perfect example of microcirculation modulated by psychological factors and hormonal status. It is the result of a complex neurovascular process. Erectile dysfunction (ED) is defined as the consistent or recurrent inability of a man to attain and/or maintain a penile erection sufficient for sexual activity. Phosphodiesterase 5A gene encodes a cGMP-binding, cGMP-specific phosphodiesterase, a member of the cyclic nucleotide phosphodiesterase family. Phosphodiesterase-5 (PDE5 (EC 3.1.4.35)) specifically hydrolyzes cGMP to 5'-GMP. It is involved in the regulation of intracellular concentrations of cyclic nucleotides and is important for smooth muscle relaxation in the cardiovascular system. *Rosa Damascena* Mill. known as Damask rose belongs to the family Rosaceae. There is some evidence that demonstrated this plant may be useful in the management of reproductive disorders. In this study, we investigated the inhibitory effect of *R.damascena* phytochemical compounds on PDE5 using computational methods. The three-dimensional (3D) structure of the PDE5 was downloaded from RCSB (PDB ID: 2h42). Using FOODB database, a library of phytochemical compounds in *R.damascena* was prepared. Molecular docking procedure was performed using the Molegro Virtual Docker (MVD) program. The pkCSM server was used to evaluate the toxicity. The SwissADME server (http://www.swissadme.ch/) was used to check for drug-likeness. Sildenafil was used as a positive control. The interaction of 11 compounds in *R.damascena* with PDE5 was surveyed through molecular docking by MVD software. The parameters of cardiotoxicity, skin sensitisation and hepatotoxicity were assayed and the compounds were evaluated for chemical parameters of Lipinski's rule. Based on the results of molecular docking, *R.damascena* phytochemical compounds have the ability to inhibit PDE5, These compounds were examined in accordance with Lipinski's rule and complied with this rule. The present results suggest that *R.damascena* exerts significant effects in order to improve erectile dysfunction and is not toxic for human body.

Keywords: Erectile dysfunction (ED), in silico, molegro virtual docker (MVD), Phosphodiesterase-5(PDE5), *Rosa damascene*, Sildenafil.

Investigating the effects of curcumin on cancers

Fahiemeh Bahramnejad - Dorna Dehghani

Abstract

Diet is one of the most important factors in preventing cancer. Many people around the world use a variety of ingredients in their diet, including spices such as red pepper, cloves, black pepper and cumin. Interestingly, these compounds are used as chemotherapeutic agents. One of the compounds considered for cancer treatment today is curcumin. Curcormin, which has been used in the treatment of many cancers, including cancers of the brain, breast, liver, leukemia, prostate, colon, etc. Curcumin, a natural flavonoid and proapoptotic combination of rhizome from Curcuma longa, has strong anti-inflammatory, antioxidant and In leukemia, this compound affects the modulation of NF-kappaB, Jak / STAT, WT1, regulated extracellular signal kinase and other key molecules associated with tumorigenesis. Numerous dietary and pharmacological factors have been suggested as alternative strategies for the treatment and prevention of colorectal cancer. Curcumin, an active ingredient in turmeric, which inhibits the growth of malignant neoplasms, plays an important role in the prevention and treatment of colorectal cancer. EGF-R-associated protein (ERRP), a new inhibitor called erbB, is a potential therapeutic agent for colorectal cancer. Studies have shown the effect of curcumine on liver cancer cells. According to these studies, curcumin in different stages and fields such as: Regulation of several signal transduction pathways such as epidermal factor receptor, nuclear receptor, active protein 1, hecting / TCF, activated motioganase protein kinase (MAPK) and Akt pathway, expression of many liver enzymes (such as c-jun, c-fos, c -myc, cyclooxygenase-2 and NOS), which are involved in proliferation, differentiation, apoptosis and angiogenesis; Transcription factor Nuclear factor E2 Factor 2 (Nrf2) involved in the regulation of the antioxidant response element (ARE) may play a role. According to our research, curcumin can play an important role in the treatment and prevention of many cancers

Keywords: curcumin,cancer,signal pathway

Ethnopharmacology a powerful tool in the treatment of diseases with medicinal plants

Maryam Rasty

Abstract

Ethnopharmacology is a powerful tool that paves the way for the discovery of new drugs by creating opportunities for interdisciplinary and multidisciplinary collaboration as well as gaining valuable information about medicinal plants used in different cultures. Ethnopharmacology is the observation, identification, description, and experimental study of the components and clinical effects of indigenous drugs and a multidisciplinary field of study based on botany, pharmacology, toxicology, phytochemistry, and chemistry, but related to other disciplines such as anthropology. In fact, the scientific study of biologically active substances has traditionally been used or observed by humans. In this work, medicinal plants from different parts of Iran such as Bushehr Hillah River, Tangestan, Bushehr, Genaveh, Kurdistan, Kerman, Sistan. Baluchistan and ... were calculated and studied by Relative Frequency of Citation and Cultural Importance Index for each medicinal plant in the city. A wide variety of medicinal plants such as Zataria multiflora, eriophora DC, Foeniculum vulgare, Teucrium polium, Haplophyllum tuberculatum, Cuminum cyminum, Plantago psyllium, Nigella sativa, Cichorium intybus, Citrolus colocynthis ,... and edible plants such as barberry, kiwi, onion, etc. in these areas showed some of these plants They are used for various diseases and research on these medicinal plants can be the beginning of a way to discover new drugs in the field of treatment. The most common medicinal uses of plants are for gastrointestinal diseases, obstetrics, respiratory diseases, infectious diseases, hot tempers and metabolic diseases, respectively. Research on these medicinal plants can be the beginning of a way to discover new drugs in the field of treatment. We also realize that everywhere in our country Iran is rich in pastures, natural resources and medicinal plants that can be done with ethnopharmacology method to do a lot of research on the properties of plants and prove their medicinal properties.

Keywords: Ethnopharmacology, medicinal plants, treatment, food plants.

In silico Molecular Docking Analysis Targeting SARS-CoV-2 Spike Protein and Human ACE2 Receptor with Herbal Anti-cancer components and chloroquine

Seyedeh Mahya Marashiyan[1], Fateme Davodabadi[2], Javad Arabpour[3]

Abstract

Nowadays, molecular docking analysis is usually used to comprehend and predict the interaction between a target protein from a microbe and a drug molecule in modern drug discovery. The entry and replication of pathogens in host cells can be inhibited by drugs identified in this way. The world is suffering from a deadly and highly contagious disease called COVID-19. Due to the results of available vaccines against the SARS-CoV-2 virus, the need for effective drugs in recovery for patients is felt more than ever. Since ancient times, herbal medicines are often used as natural cures for treating different infectious diseases. The spike protein (S) of the SARS-CoV-2 and ACE2 receptor Has a crucial role in this virus's attachment and pathogenesis. Recent studies have examined anti-cancer drugs' effect on the recovery of COVID-19 patients and have had promising results. Thus, this research focused on searching helpful ligands for S protein and ACE2 receptor between active constituents existing in anti-cancer herbs that could serve as effective treatments for COVID-19. First, we examined the properties of 10 herbal anti-cancer compounds and the common drug COVID 19, chloroquine, and in a table, we compared the results of their docking analysis with Spike viral protein and ACE2 receptor. In docking analysis, compound “G” (epigallocatechin gallate (eGCG)) was found to have the highest binding affinity with the ACE2 and SARS-CoV-2 Spike Protein, followed by compounds “B” (Curcumin), “A”(Tanshinone IIA), and “E” (Chrysophanol). Finally, by examining the above compounds, we concluded that the binding power of these compounds with Spike protein and ACE 2is higher than that of chloroquine, which, of course, needs further investigation by experts. This report can help to develop a novel ethno-drug formulation for preventing or treating the COVID-19.

Keywords: SARS-CoV-2, COVID-19, Spike protein, ACE2, molecular docking, in-silico, chloroquine, herbal medicine, Anti-cancer

1- Department of Medical Nanotechnology, School of Advanced Technologies in Medicine, Tehran University of Medical Sciences, Tehran, Iran; sm.marashiyan@gmail.com

2 - Department of Biology, Faculty of Basic Science, Payame Noor University, Tehran, Iran; fatemedvodi078@gmail.com

3-Department of Microbiology, Faculty of new sciences, Tehran Medical Branch, Islamic Azad University, Tehran, Iran; Arbpourjavad@gmail.com

Investigation of stability and bio-availability of natural dyes via niosomes: study anti-diabetic

Soudeh shiri[1], Kamaladin Gharanjig[1]

[1]Department of Organic Colorants, Institute for Color, Science and Technology, Tehran 16765-654, Iran

Abstract

Diabetes is a common disease in the present age. This disease is chronic, and there are various ways to treat and control it, such as chemical drugs and insulin. All of these methods have long-term side effects on the body. Today, the use of natural plants to treat diabetes is of interest to scientists. Because plants have little effectiveness and stability, new methods are being used to increase the efficacy using nanotechnology [1-4]. We decided to study the effectiveness of natural materials loaded into the niosome. Recent studies prove that natural dyes such as berberine indicate excellent potentialities in the therapy of diabetes by the hypoglycemic mechanisms, including increment of insulin sensitivity.

Keywords: Natural dyes, Bio-availability, Berberine, Niosomes, Diabetes.

Physiological and biochemical characterization of Peppermint (Mentha piperita L.) and Sweet Basil (Ocimum basilicum L.) in the Water- stream Hydroponic system

Mahsa Daryadar

G.S. Davtyan Institute of Hydroponics Problems, Laboratory of Plant Nutrition and Productivity, National Academy of Sciences, Yerevan 0082, 108 Noragyugh, Republic of Armenia.

***Corresponding author:** daryadarmahsa0@gmail.com

Abstract

In the condition of soilless culture, some environmental factors that contribute to the high productivity of plants play an important role in the studies of physiological and biochemical characteristics of plants grown in a hydroponic way, and especially those processes that are directly related to plant growth and development. The research objective is the study of properties of valuable, pharmacologically endowed, essential oil plants (Peppermint (*Mentha piperita* L.) and Sweet Basil (*Ocimum basilicum* L.)) as well as the development of the soilless production biotechnology with enhancing of their effectiveness and secondary metabolites in the water-stream hydroponics system. Comparisons were made with classical hydroponics and soil culture. Plant raw material of peppermint and sweet basil received using different hydroponic methods prevail soil culture in dry weight 1.4-2.6 and 1.9-3.3 times. During the vegetation in the leaves of peppermint and sweet basil, high content of free water was distinguished in the plants grown in hydroponics culture, particularly in cylindrical hydroponics, which exceeded soil culture 1.2-1.5 times. At the same time, in all hydroponic variants was observed a relatively small amount of bound water and cell sap osmotic pressure, compared to soil control.

Keywords: biochemical, peppermint. physiological, sweet basil, water-stream hydroponics

Antifungal Effect of hexane extract of *Euphorbia helioscopia* root smoke

Amirarsalan Kavyanifard

Department of Biology, Payame Noor University, Tehran, 1395-4697, Iran.

Abstract:

Candida albicans is one of the most commonly identified fungi in wounds and can be a cause of delayed wound healing. Since *Euphorbia helioscopia* root smoke is used traditionally to treat wound healing in west of Iran, we undertook the study to investigate antifungal properties of hexane extract of its root smoke against *C. albicans* ATCC 10231. Liquefied smoke of *E. helioscopia* root was extracted by hexane and its antifungal property was investigated using agar dilution method (1, 2, 4, 8, 16, 32, 64, 128 and 256 mg/ml) on Sabouraud dextrose agar. Results showed that all concentrations of hexane extract of *E. helioscopia* root smoke inhibits *C. albicans* growth. Our study showed antifungal effects of the extract against *C. albicans* and demonstrated the accuracy of traditional use of *E. helioscopia* root smoke for treatment of wounds.

Keywords: Antifungal, *Candida albicans*, *Euphorbia helioscopia*, hexane extract, wound.

Evaluation of the performance of stevia and olive extract in the production of organic toothpaste

Mojtaba Goodarzi[1*], Ali Najafi[2]

[1*] Faculty of Biology, Farhangin Univesity, Tehran, Iran(Clonerv000@gmail.com)

[2] Faculty of Biology, Farhangian University, Tehran ,Iran

Abstract:

Background and aim: the aim of this study is survey on today toothpaste for get new experiences, challenge and positive and negative points about the effect of toothpaste in some part of Human body system such as Digestive, Skin and maybe Urination. A fact is We focus on Sensitive Chemicals that has suspicious effects on body, examples: Sodium lauryl sulfate, Saccharin and etc.

Materials and Methods: Chemicals are Sodium lauryl sulfate, Sorbitol Solution 70%, Calcium Carbonates, Oleic acid, Linoleic acid and Polypropylene glycol in addition Sodium Saccharine, Fist we Measurement the solubility of all of the Chemicals Expect Sodium Saccharine in Cold and Pure water and then we Measurement the acidity level by usage the Calibrated pH Meter, for extraction the Oleic and Linoleic (Available in Olive oil) Used Gas Chromatography, About the Sodium Saccharine, We used ready sample Manufactured by Merk Company.

Results: the results of test indicative while Sodium lauryl sulfate, Sorbitol Solution and Sodium Saccharine has a harmful effect, this chemicals can exacerbation some of the digestive diseases in Skin and digestive system.

Conclusion: Adding the sap of Stevia rebaudiana plant as a sweeter instead of Sodium Saccharine and extracting the Linoleic acid from Olive oil and add to them as emollient instead of Sorbitol Solution can alleviation the questionable effects of current toothpastes.

Keywords: toothpaste, Stevia, Olive, Mouth, Digestive system

The important medicinal and industrial properties of Calotropis procera (Aiton) W.T

Zahra Mohebi[1*]

[1]Department of Natural Resources, Faculty of Agricultural Sciences & Natural Resources, Razi University, Kermanshah, Iran.

email: z.mohebi@razi.ac.ir

Abstract

Calotropis (*Calotropis procera* (Aiton) W. T. Aiton) is a spreading shrub or medium-sized tree reaching 2.5 to 6 m in height. It has a deep taproot, 3-4 m deep, and a secondary root system with woody lateral roots that may rapidly regenerate adventitious shoots when the plant is injured. The stems are crooked and covered with a fissured corky bark. The grey-green leaves are 15- 30 cm long and 2.5-10 cm broad and have a succulent and waxy appearance, hence the name procera, which means wax in latin. Compounds derived from the plant have been found to have emetic-cathartic and digitalic properties. The principal active compounds are asclepin and mudarin. Other compounds have been found to have bactericidal and vermicidal propertie. The root bark is an emetic. An infusion of bark powder is used in the treatment and cure of leprosy and elephantiasis. The extremely poisonous roots are used in the treatment of snakebites. The leaves are used for the treatment of asthma. The milky sap is used as a rubefacient and is also strongly purgative and caustic. The latex is used for treating ringworm, guinea worm blisters, scorpion stings, venereal sores and ophthalmic disorders, it is also used as a laxative. The local effect of the latex on the conjunctiva is congestion, epiphora and local anaesthesia. The latex contains a proteolytic enzyme called caloptropaine. The flower is digestive and tonic. It is used in the treatment of asthma and catarrh. The twigs are applied for the preparation of diuretics, stomach tonic and anti-diarrhoetics and for asthma. Also used in abortion, as an anthelmintic, for colic, cough, whooping cough, dysentery, headache, lice treatment, jaundice, sore gums and mouth, toothache, sterility, swellings and ulcers. Also, stem fibre used for various purposes, such as for making ropes, to form cheap cots, gunny bags, bow strings, fishing nets, and in the manufacture of paper, pulp and duplicating stencils.

Keywords: *Calotropis procera (*Aiton*) W. T.* Aiton, medicinal composition, industrial properties

Anti bacterial effects of Saponair officinalis extracts (saponin) against Motile salmonella SP. (a farm Isolate)

Nabinejad, Abdolreza (DVM,PhD)1*

Razi vaccine and serum research institute(RVSRI) at Isfahan Agricultural and Natural Resources Research and Education Center,(AREEO), Isfahan, Iran

Abstract

Now a days antibiotic residues in crude or cooked foods are the most ant nutrient materials of foods, they not only decrease the nutritional value of foods but also caused bacterial resistances, hepattonephric damages and sometimes they are carcinogen or teratogens .if the organoleptic characters of such food be afraid.

In other hand using antibiotics for disease control in broilers and or breeders (egg layers) can not be forbidden, but it could manages for preparing a safe food or it is possible present new natural antibiotics what we mean as natural drugs like herbal drugs, nonmaterial and so on., Ancients used Saponaire flowers and risomes for washing the hair and body skin in bathroom also diuretic and blood refining characters.

In current study using Saponaire Of. (related to Caryophllacaea familly) hydro alcoholic extracts for invitro inhibition growth of an Isolated fatal motile Salmonella Sp.were reported .The saponaria extracts which is called as saponin, therefore after isolation and identification of isolated Motile Salmonella Sp. using common bacterologic and biochemical tests, the disc diffusion method was used for avaluation the antibacterial effects of saponaire extracts in comparison to some routine antibiotics .

Hydroalcohoic extracts of saponaire officinalis prepared and save in 4C dark tube Some filter papers punched, sterilized and used as disk for preparation the saponine disks as 10 µ Li ,15 µ Li and 20 µ Li and incubated 15 hrs at 37 C for drying.

The Isolated E-coli were propagated in Muller hintone broth and incubated at 25 C for 6 hrs adjusted to Mc Farland standard and cultured on Muller hintone agar for antibiogram tests, meanwhile 3 current .antibiotic disc included Oxytetracycline(Oxy), Danofloxacin(Dfx) and Fosbac(Fos) for compartment in 3 times, in each exam, cultured test plate incubated overnight in 37C and immediately the zone of inhibition diameter were measured .

Based on the results the zone of inhibition for 10 µ Li ,15 µ Li and 20 µ L of Saponiare disks were 16 mm,18 m and 19 mm respectively, and the zone of inhiboition diameter for antibiotic disks of Fos ,Oxy and Dfx were 15 mm, 0 mm and 14 mm respectively.

Keywords: Antibiogram, Salmonella, Motile, Saponin,

The *Calendula officinalis* used in polymeric hydrogel burn dressings to improve the wound healing process

Yasamin Azimi, Mohsen Shahrousvand *, Jamshid Mohammadi-Rovshandeh, Hojjat Basati

Caspian Faculty of Engineering, College of Engineering, University of Tehran, P.O. Box 43841-119, Guilan, Rezvanshar, Iran

Abstract

The development of ideal wound dressing is crucial to facilitate the healing process and for the treatment of a wound for protection against physical, thermal, chemical, biological, and other trauma. Hydrogels are being preferred as wound dressings owing to their flexibility, non-antigenicity, and permeability to water, oxygen, and metabolites. On the other hand, Medicinal plants such as *Calendula officinalis* (*C. officinalis*) are commonly used for skin wounds' treatment. The *C. officinalis* or pot marigold is an aromatic plant with orange or yellow flowers that can be used for wound healing applications namely burns, cuts, rashes, bruise, and foot ulcer treatments. This herb has some pharmacological properties including antioxidant, anti-inflammatory, antifungal, antiviral, antibacterial, antiseptic, free radicals inhibitors, and blood coagulation activity. In this study, for the first time, semi-IPN hydrogels were prepared from Guar gum (GG) as a natural polymer and poly acrylic acid (PAA) as a synthetic polymer. Then *C. officinalis* was loaded into the synthesized hydrogels. The hydrogels were characterized using SEM, FTIR, and then evaluated for their mechanical property (tensile strength), swelling behavior, and water vapor transmission rate (WVTR), gel fraction, and antibacterial analysis. The study showed *C. officinalis* loaded hydrogels are the potential drug release wound dressing materials.

Keywords: Calendula flower extract, marigold, dressings, wound healing, polyacrylic acid

Evaluation of the protective effect of green tea polyphenols for sub-acute toxicity of diazinon in mice

Fereshteh Mehri[1], Amir Sasan Mozaffari Nejad[2,*]

1. Nutrition Health Research Center, Hamadan University of Medical Sciences, Hamadan, Iran.

2. Department of Microbiology, Nutrition Health Research Center, Hamadan University of Medical Sciences and Health Services, Hamadan, Iran.

Email: freshteh_mehri@yahoo.com & asmozafarinejad@yahoo.in

Abstract

Background: Studies have shown that an organophosphorus pesticide such as diazinon induces oxidative stress injury and damage in various tissues.

Objectives: This study conducted to investigate the effects of green tea polyphenols **(**GTP) on the liver function of diazinon -poisoned animals.

Methods: Twenty-eight mice were divided into four groups of the control, GTP (400 mg/kg), diazinon + GTP, and diazinon. Animals received malathion 80 mg/kg and SA 400 mg/kg for one week through intraperitoneal injection. Then, their liver and blood samples were extracted, and alanine aminotransferase, aspartate aminotransferase concentrations in serum as well as biomarkers of oxidative stress such as Total Antioxidant Capacity (TAC), Lipid Peroxidation (LPO) and catalase (CAT) activity in the liver tissue were measured.

Results: The results indicated that the GTP administration decreased the level of liver LPO compared with that in the diazinon group. Also, receiving GTP increased liver TAC and CAT levels in mice, which this difference was significant than the diazinon group. In addition to, the GTP group showed a significant reduced in liver enzyme levels than the diazinon treated group. Conclusion: Based to the results, GTP exerted protective effects against diazinon poisoning, by decrease of oxidative stress. Thus, GTP can be an antioxidant to counteract the risk effects of diazinon poising in liver tissue.

Keyword: Diazinon, Green tea polyphenols (GTP), Oxidative stress, Mice

A review of recent advances on the efficacy of natural compounds extracted from medicinal plants as a biological control agent of mycotoxins contamination

Amir Sasan Mozaffari Nejad[1], Ali Heshmati[2, *], Fereshteh Mehri[3]

1. Department of Microbiology, Nutrition Health Research Center, Hamadan University of Medical Sciences and Health Services, Hamadan, Iran.

2. Department of Nutrition and Food Safety, Nutrition Health Research Center, Hamadan University of Medical Sciences and Health Services, Hamadan, Iran.

3. Nutrition Health Research Center, Hamadan University of Medical Sciences, Hamadan, Iran.

Email: ali_heshmaati@yahoo.com & asmozafarinejad@yahoo.in

Abstract

Mycotoxins or fungal toxins are secondary metabolites with low-molecular-weight biomolecules produced by fungi. They are highly toxic, mutagenic, teratogenic, and carcinogenic which causes massive health problems for humans and animals. In addition, fungal spoilage impacts food and agricultural economic state. Over the past decades, plant natural products have played an important role in the lives of human beings for their use as a source of food and medicine. The medicinal properties in plants typically result from the different combinations of these natural compounds known as phytochemicals. In recent years, the several studies use of natural compounds as natural preservatives in post-harvest management of agriculture products. In the current review, we showed that the use of natural compounds can be effect on control of growth of fungi that produce mycotoxin in agriculture products. Because of this, the use of medicinal plant compounds should be remarked for the industry as a natural biological agent for preserving quality properties and food safety in agriculture products.

Keywords: Biological activity, Detoxification, Food safety, Medicinal plant, Mycotoxins.

The effect of nano-fertilizers on the growth and nutrition of orchard plants

Mahdieh Rezaei Tabar - Mohammad Ebrahim Ramazani

Global agricultural systems confront many problems, such as plant nutrition. The latest researches and the progress of new sciences, nanotechnology is importance in the plant nutrition solutions for the solved this problems. Applications of nanotechnology are in all of stages production, processing, storage, packaging and transportation of agricultural products that increase the quantity and quality of products. Nano-fertilizers campare whit usuale fertilizers have more efficient for plant root. In addition to plant nutrition, nano-fertilizers have other potential applications such as identifying pollutants, controlling plant diseases, pests and pathogens that can be an effective step towards sustainable and environmentally friendly agriculture. This article give an overview of the effect of nano-fertilizer on the nutrition and growth of horticultural plants.

Keywords: Sustainable agriculture, Plant Nutrition, Nano-fertilizer, Garden Plants

Effect of Nano-composite coating on post-harvest crops

Mahdieh Rezaei Tabar - Rahim Naghshi Band

Consumers prefer healthy and nutritious crops diet worldwide, and demand for fresh fruits and vegetables is growing rapidly. Horticultural crops have a short postharvest life, and physical damage from impact and pressure, moisture loss, biochemical changes, and microbial decay after harvest are the main causes of decrease quality and reduced shelf life. The one of effective strategy in packaging and coating crops is use of nano-composites for improve the post-harvest life of whole and sliced fruits and vegetables, which delays the process of processing, reduces respiration, reduces crops spoilage and increases their shelf life and maintains crop quality. This article give an overview of the effect of nano-composite coating on post-harvest crops.

Keywords: Nano-composites, postharvest, Horticultural crops.

A review of truffle species in Iran

Masoud Sheibani[1] and Samad Jamali[2]:

1: MSc Student, Department of Plant Protection, College of Agriculture, Razi University, Kermanshah, Iran (masoud.sheibani@yahoo.com)

2: Associate Prof. in Mycology, Department of Plant Protection, College of Agriculture, Razi University, Kermanshah, Iran (jamali454@yahoo.com)

Abstract

Truffles are the hypogeous fruiting bodies of Ascomycete fungi. Truffles can be divided into two types; tuber and desert truffles. They are obligate ectomycorrhiza of plants that live entirely underground in symbiosis with roots of members of some trees, mostly oaks, *Cistaceae*, mainly with *Helianthemum* species, both annual and perennial, shrubs as *Cistus*, and members of *Cypraceae*. The hypogeous ascomycete fungi (truffles) are now distributed among six Pezizalean families including *Glaziellaceae*, *Discinaceae-Morchellaceae*, *Helvellaceae*, *Tuberaceae*, *Pezizaceae*, and *Pyronemataceae*, comprising 38 genera. Tuber is a genus in the Tuberaceae family of fungi and desert truffles in other families. In Iran, due to the economic, ecological, nutritional and medicinal importance of truffles, studies began in 2014 and so far the existence of *Tuber aestivum* from Tuberaceae, *Picoa juniperi* and *Picoa lefebvrei*, *Geopora cooperi* and *Geopora ramila* from the family Pyronemataceae and *Terfezia claveryi*, *Terfezia boudieri*, *Tirmania pinoyi* and *Tirmania nivea* from the family Pezizaceae have been confirmed based on morphological and molecular characteristics. Further scientific research is needed to identify other species, identify symbiotic plants, cultivation and commercialize these valuable products.

Keywords: Ectomycorrhiza, Endomycorrhiza, Iran, Desert truffles, Symbiosis

Co-culture of *Ganoderma lucidum* with *Bacillus subtilis* and *Aspergillus niger:* Optimization of gonodric acid production in bubble column bioreactor

Ashrafalsadat Hatamian-Zarmi[a,*], Dana Shakiba[a], Hale Alvandi[a], Zahra Beagom Mokhtari-Hosseini[b], Bahman Ebrahimi-Hoseinzadeh[a]

a Department of Life Sciences Engineering, Faculty of New Sciences and Technologies, University of Tehran, Tehran, Iran.
b Chemical Engineering Group, Faculty of Petroleum and Petrochemical Engineering, Hakim Sabzevari University, Sabzevar, Iran.
*Corresponding author: hatamian_a@ut.ac.ir

Abstract

Among medicinal fungi, *Ganoderma lucidum* is one of the most beneficial fungi that has been used in Asian countries for more than two thousand years. *G. lucidum* is used to treat migraines, high blood pressure, arthritis, gastritis, diabetes, lupus erythematosus, and cardiovascular problems. The metabolites of this fungus have anti-cancer properties and can be used in combination with chemotherapy to treat cancer. The mentioned properties are related to this fungus's secondary metabolites, including terpenoids; Triterpenes are a large group of organic compounds with an aromatic structure, of which ganoderic acids is a member. The low production efficiency of ganoderic acids from *G. lucidum* has limited its use as a valuable secondary metabolite. Studies show that elicitors increase the production of ganoderic acids in this fungus. Among the elicitors that can stimulate the growth and production of secondary metabolites are volatile microbial organic compounds produced in co-cultures. In this study, the growth of *G. lucidum* and the production of ganoderic acids in the presence of microbial volatile organic compounds from *Bacillus subtilis* and *Aspergillus niger* were investigated. By examining the effect of variables (day and volume of co-culture), the amount of ganoderic acids extracted was 2.9 times higher than the control. The production of ganoderic acids in the bioreactor was then investigated. The effect of initial inoculation percentage, temperature, length to diameter ratio, and aeration rate on ganoderic acids production was studied, and the Taguchi method was selected to optimize these variables. The results showed that the percentage of initial inoculation and temperature had significant effects on biomass production; with a simultaneous increase in temperature and inoculation percentage, biomass production increases. These two variables significantly affect ganoderic acid production, and optimal production condition is 10% of initial inoculation, temperature 25.6 °C, length to diameter ratio of 4.8, and aeration rate of 0.64 vvm. This study shows that microbial volatile organic compounds in the simultaneous microorganism culture can increase the production of ganoderic acids by *G. lucidum*. Co-cultures could be used to produce other valuable metabolites of *G. lucidum*, such as medicinal polysaccharides.

Keywords: *Ganoderma lucidum*, Ganoderic acids, Secondary metabolites, Taguchi method

The Effect of Different Drying Methods on antioxidant properties of edible mushrooms

Maede Shahiri Tabarestani

Department of Agriculture, Payame Noor University, Tehran, Iran.

Abstract

Edible mushrooms contain minerals, vitamins, and essential amino acids for the human body. These are used as raw, dried with antitumor, antibacterial, antiviral, and antioxidant properties. Antioxidants are important compounds that can protect health by damping active oxygen and free radicals which are produced abundantly in the body. Storage conditions and shelf life for antioxidants are very important for biological activities. Antioxidants and phenolic compounds are affected by storage conditions such as temperature. So, by determining the optimal temperature and storage conditions, it is possible to reduce the losses of different bioactive compounds and increase the shelf life of mushrooms. One of the most important processes after harvesting is drying in order to enhance the quality and durability of the products. The aim of this study was to determine the most effective drying method to keep the antioxidant properties of the mushroom. Based on the resource review, among different drying methods, the maximum and minimum antioxidant capacity was reported in microwave and oven methods, respectively. For drying of medicinal mushrooms such as *Shiitake Lentinula* and similar them the microwave method is proposed.

Keywords: Antioxidants, Edible mushrooms, Medicinal mushrooms

Effect of magnetic field as abiotic elicitor on growth and antioxidant activities of *Ganoderma lucidum* mycelium

Leila moradipour[1], Vahide payamnoor[2]

1-*-Corresponding author, Ph.D. student of Sylviculture and Forest Ecology, Faculty of Forestry, Agricultural Sciences and Natural Resources University of Gorgan, Shiraz, Iran

E-mail: Moradiporleila@gmail.com

2- Faculty of Forestry, Agricultural Sciences and Natural Resources University of Gorgan, Gorgan , Iran
E-mail: Mnoori56@gmail.com

Abstract

Ganoderma lucidum, commonly called reishi (Japan) and Ling Zhi (China) is a medicinal fungus, and generally observed on dead trees and timbers of deciduous forest trees such as *Quercus castaneifolia*, *Carpinus betulus*, *Parrotia persica*. *Ganoderma lucidum* owes its anti-disease properties to presence of secondary metabolites in the fruiting body, mycelium and spores. The aim of present study was to investigate the possibility of increasing the antioxidant activity of *Ganoderma lucidum* by using a magnetic field as an abiotic elicitor. Mushroom samples were collected from *Dr. Bahramnia's* Forest Management project- Golestan- Iran. One cm cultured mycelia in PDA medium were exposed to magnetic field with under 20, 40 and 60 milli tesla levels for 30, 60 and 90 minutes. The experiment was conducted as completely randomized design arrangement in factorial with three replications. The growth of the mycelia was measured over ten days. The results showed that there was no significant difference between mycelial growth trends in different treatments. The average growth of treated mycelium was 8.05 mm per day compared to the average growth of 7.4 mm per day for control. According to the results mycelium of *Ganoderma lucidum* grows "very fast" with a growth of more than 5 cm during 3-4 days. To investigate the effect of magnetic field levels on the antioxidant activities, the grown mycelium were cultured in PDB medium for 14 days and then filtered. The Extracellular methanolic extract was used to evaluate the antioxidant properties by DPPH method. Effect of magnetic field levels on the antioxidant activities of the treatments was significant but it did not make sense at different times (30, 60 and 90 minutes). Antioxidant activities were 21.54, 25.36 and 28.34 for 20, 40 and 60 mili tesla treatments respectively while was18.56 in control. So, according to the results of antioxidant properties, 60 milli tesla in 90 minutes treatment was selected as the best treatment for future experiments about secondary metabolites.

Keywords: Ganoderma lucidum, magnetic field, mycelial growth, antioxidant properties

Industrialization, commercialization and branding of medicinal plants, focusing on citrus value chain

Gholamreza Mojarradi[1] - Rezvan Mehni Raftar[2] - Motahareh Mojarradi[3]

1- Corresponding Author, Associate Professor, Department of Agricultural Extension, Communication and Rural Development, University of Zanjan
2- PhD Student in Agricultural Extension, Department of Extension, Communication and Rural Development, University of Zanjan
3- - PhD Student in Pharmacy, Faculty of Pharmaceutical Sciences, Islamic Azad University of Medical Sciences, Tehran

Abstract

Global changes in agro- processing industries have created new opportunities and challenges, especially in processing of medicinal plants by emphases on citrus value chain. Because, Agro-processing industries generate value addition by the transformation of citrus raw materials, into various products such as pharmaceutical, food, cosmetic and hygienic Products, which are readily marketable, with improved storability and higher profitability for producers and customers. This trend, as an effective strategy, requires industrialization, commercialization and branding .The skin, seeds and blooms of citrus flowers are of great importance. Citrus value chain as an agro-industrial system can be considered as a model, which illustrates the consumption, marketing, processing and production of citrus raw materials; within the boundaries of the particular socio-economic, administrative, political and financial framework. The proper management of the citrus value chain is an undeniable necessity, because of using dried citrus peel scum as a rich source of sugar, pectin and protein, producing oil from citrus seeds, having high potential for the production of various essential oils, and the possibility of producing non-alcoholic beverages, cosmetics, health and pharmaceuticals products. Citrus value chains' market-based agricultural advisory services, provides the necessary platform for providing the required knowledge for input suppliers, citrus producers, buyers, transporters, processers, distributors and consumers .By increasing their scientific and skill potential, value chain activists can play an effective role in increasing market access and better understand the benefits of industrialization, commercialization and branding in order to supply various citrus products. Market-based support services as well as facilitating skills to explore and test new technologies and processes should be provided in order to strengthen capacity and improve citrus value chain efficiency, in the form of training and consulting on technical and economic topics.

Keywords: Medicinal plants, Citrus, Value chain, Industrialization, Commercialization, Branding.

An introduction to value chain formation of Iranian mountain almond (amygdalus scoparia) with emphasis on its food, Pharmaceutical, Cosmetic ingredients, and Industrial Products applications

Mojarradi, Gholamreza [1], Zahra Sayadi[2]

1-Corresponding Author, Associate Professor, Department of Agricultural Extension, Communication and Rural Development, University of Zanjan

2-Phd student, Department of Agricultural Extension, Communication and Rural Development, University of Zanjan

Abstract

In recent years, the number of development-research studies that are related to the value chain approach or analyze value chains. So, this documentary study was conducted to investigate the value chain of Iranian mountain almond with emphasis on food, Pharmaceutical, Cosmetic ingredients, and Industrial Products. Investigating on natural habitats of Iranian mountain almond showed that this crop is growing in different parts of the country, but disregarding to value chain formation and disinvestment in scientific processing, led to this valuable crop, is marketed in raw material form, and Numerous economic opportunities in the process of turning it into a variety of products will be lost. Iranian mountain almond's Fruit, roots, gum and oil, have many properties of food, Pharmaceutical, Cosmetic ingredients, and Industrial products, but these raw materials can be used to produce various products in the form of food, Pharmaceutical, Cosmetic ingredients, and even Industrial products, only by formation of Iranian mountain almond value chain.

Keywords: Value chain, Iranian mountain almond, Gum, Bitter almond oil, Herbal medicine, Raw Materials Sales

Kojic acid and its use in inhibiting tyrosinase and preventing hyperpigmentation

Fahiemeh Bahramnejad - Dorna Dehghani

Abstract

Abstract: Kojic acid , 5-hydroxy-2-(hydroxymethyl)-4H-pyran-4-one, is an organic acid that secreted by various fungi like Penicillium, Mucor, Aspergillus etc. Aspergillus flavus is the most well- known fungus that secrets Kojic acid as a secondary metabolite during aerobic fermentation. This organic acid has many applications in medicine, food industry, agriculture, cosmetics and chemistry. The major application of Kojic acid and its derivatives is in cosmetic and pharmaceutical industries. Skin is one of the most important organ that is exposed to harmful rays that cause melasma. Tyrosinase is a type III copper-containing enzyme that involved in melanin biosynthesis and hyperpigmentation. Therefore the effect on tyrosinase activity can play a role in preventing hyperpigmentation. In addition to ultraviolet rays, other factors are involved in tyrosinase gene transcription and hyperpigmentation, including free radicals and metal ions. Kojic acid has the ability to inhibit the enzyme tyrosinase by controlling intracellular signaling pathways and in addition this organic acid with chelate copper ion in active site cause a competitive inhibition effect. Finally, kojic acid from fungi is involved in skin whitening creams, skin protection lotions, etc.

Our studies show that the use of kojic acid cream and its topical application has a greater effect on melasma than hydroquinone cream.

Keywords: Aspergillus flavus, Kojic acid, Tyrosinase

Study of antimicrobial property of extracted chitosan from wild edible mushrooms

Negin Karami[1] and Nassim Shavisi[2]

[1]Department of Food Hygiene, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran

[2]Department of Food Hygiene and Quality Control, Faculty of Veterinary Medicine, Razi University, Kermanshah, Iran

Abstract

Plastics have been one of the highly valued materials and it plays a significant role in human's life such as in food packaging and biomedical applications (1). Bioplastic materials can gradually work as a substitute for various materials based on fossil oil. The issue like sustainability and environmental challenges which occur due to manufacturing and disposal of synthetic plastics can be conquering by bio-based plastics (2). In the present study, extracted chitosan solution mixed with glycerol 2% to produce edible films. The antimicrobial property of edible film was evaluated against bacterial food-borne pathogens (*Staphylococcus aureus*, *Bacillus subtilis*, *Bacillus cereus*, *Listeria monocytogenes*, *Salmonella typhimurium* and *Escherichia coli* O157:H7). The Minimum Inhibitory/Bactericidal Concentration (MIC/MBC) values of the edible film did not differ between gram negative and positive bacteria. *S. aureus*, *B. subtilis*, *S. typhimurium* and *E. coli* O157:H7 had similar sensitivity to the edible film, *L. monocytogenes* and *B. cereus* showed more sensitivity.

Keywords: Antimicrobial property, Chitosan, Wild edible mushrooms

Evaluation of antioxidant and antimicrobial activities of Echium italicum L. extracts, (leaf, flower, stem and seed)

Zahra Dashtizadeh[*1], Abdolrasoul H. Ebrahimabadi[2], Azam Monfared[3], Sayed Ahmad Mirshokraei[4], Samaneh Heydari[5]

1 .Master of Science, Department of Chemistry, Payame Noor University, Mashhad. Iran, Email: zdz5879@gmail.com

2 .Associate Professor, Essential Oils Research Institute, University of Kashan, Kashan. Iran, Email: aebrahimabadi@kashanu.ac.ir

3 .Associate Professor, Department of chemistry, Payame Noor University, Tehran. Iran, Email: dmonfared@@gmail.com

4. Professor, Department of chemistry, Payame Noor University, Tehran. Iran, Email: a.mirshokraei@gmail.com

5. PhD student, Department of Chemistry, Mohaghegh Ardabili University, Ardabil. Iran, Email: heydari.samaneh.sh@gmail.com

Abstract

In antioxidant activities, by DPPH test, IC_{50} values 63.11±1.45, 102.81±1.08, 201.24±2.18 and 131.62±0.46 µg/ml were obtained for leaf, flower, stem and seed extract respectively, comparable to that of BHT (IC_{50} = 19.72± 0.80 µg/ml). In beta-carotene-linolenic acid test, inhibition percentages of %57.22, %48.74, %48.48 and %44.85 were recorded for leaf, flower, stem and seed extracts, respectively, comparable to that of BHT (%89.43). In total phenolic compounds contents of the extracts equivalent to galic acid were evaluated 68.82, 30.25, 16.76 and 27.86 µg/mg for leaf, flower, stem and seed extracts,respectively.In antimicrobial activity by disk diffusion method, leaf extract, inhibited paratyphoid microbe with a 12 mm corona by at least 60.25µg/ml dilution, stem extract inhibited pneumonia microbe by 18 mm corona at least 500µg/ml dilution and flower extract inhibited two before microbes with a 12 and 13mm coronas by at least 500 and 250µg/ml dilutions respectively.

Keywords: *Echium italicum* L., *Boriginaceae*; Extract; Antioxidant activity; DPPH assay, Folin-Ciocalteu test; Beta-carotene test; Antimicrobial activity; Disk diffusion method; Micro-broth dilution.

Ethnobotanical study of Kohmareh sorkhi region (Fars Province)

Zeinab Jeihooni nezhad, Samaneh Mosaferi*

Department of Plant Sciences, Faculty of Biological Sciences, Alzahra University, Tehran, Iran

*Correspondence: s.mosaferi@alzahra.ac.ir

Abstract

Medicinal plants play an important role in the life and culture of each country. In Iran, indigenous knowledge of using medicinal plants and traditional medicine goes back to ancient times. The main purpose of the ethnobotanical study is to identify medicinal and valuable plants used by local people. Over time and generations, this valuable knowledge is gradually disappearing because it is orally and is not documented. Moreover, the careless and excessive harvest of these plants in some regions leads to the decrease or extinction of some medicinal plants. In this study, the ethnobotany of three villages in Kohmareh sorkhi region was investigated. Gathering information was done by designed questionnaires from indigenous people aged 33-85 years old. Plants were collected in different seasons during 2019-2020 and identified using different botanical resources. Totally 35 species from 20 families have been reported by local people. Rosaceae, Asteraceae and, Apiaceae are the most locally used families. The parts of the plants most frequently used was leaf (36%) and seed (15%). The highest number of applications were reported for cold, digestive disorder and, blood fat.

Keywords: Ethnobotany, Medicinal plants, Kohmareh sorkhi, Fars province

Improving the growth and biochemical traits of black cumin (*Nigella sativa* L.) by applying Humic acid and Azotobacter

Sudabeh Mafakheri[1*], Behvar Asghari[2]

[1] Assistant Professor, Department of Horticultural Sciences, Faculty of Agriculture and Natural Resources. Imam Khomeini International University, Qazvin. Iran.

[2] Associate Professor, Department of Horticultural Sciences, Faculty of Agriculture and Natural Resources. Imam Khomeini International University, Qazvin. Iran.

- Corresponding author. Email address: smafakheri@gmail.com

Abstract

The safe production (chemical-free) of medicinal and aromatic plants has been the focus of interest of various researchers worldwide. Therefore, the aim of this greenhouse experiment was to study the effect of Humic acid and Azotobacter on growth, seed yield and oil content and constituents of black cumin (*Nigella sativa* L.). The treatments included Control (Plants were not received any bio-fertilizers), Humic acid, Azotobacter (*Azotobacter chroococcum*) and combination of Humic acid and Azotobacter. The results clearly showed that combination use of Humic acid and Azotobacter positively affected plant morphological and biochemical traits including, plant height (38 cm), capsule number per plant (14.83), seed yield per plant (7.3 gr), essential oil percentage (0.41 %) and Fixed oil percentage (27.6 %). Moreover, the GC-MS analysis of essential oil indicated that the main constituents including Thymoquinone (31.52 %), p-cymene (7.32 %), Limonene (7.15 %) and Thymol (3.8 %), were also affected by Humic acid +Azotobacter application.

Keywords: Essential Oil, Fixed Oil, Thymol, trans-Anethole

The Impact of Glutamic Acid Foliar Application on Physiological and Biochemical Attributes of *Stevia Rebaudiana* at Greenhouse Conditions

Roya Javadi[4], Ali Soleimani[1*], Ali Ammarlou[5] and Azizollah Kheiri[1]

Abstract

Stevia is a perennial herbaceous plant belonging to the *Asteraceae* family that is used as a natural sweetener in the pharmaceutical and food industries today. In order to investigate the effect of foliar application of glutamic acid on some growth parameters and biochemical traits of this plant, different concentrations of glutamic acid were applied. Treatments included 0 (control), 50, 100, 150 mg/l glutamic acid, which conducted based on completely randomized design with three replications in greenhouse growth conditions. All treatments were applied at four stages with an interval of 10 days. Based on the results, the highest amount of shoot growth (47.35 cm) and TSS (1.7 %) as well as the maximum number of leaves (108) were obtained by 150 mg/l glutamic acid. The highest amount of total chlorophyll (11.86 mg/g FW) and total phenol (349.87 mg/g FW) were observed in 50 mg/l treatment. Generally, the results showed a positive effect of leaf foliar application of glutamic acid on the studied traits of stevia plant however, it needs further research to reveal the effect of these kinds of treatments on steviol glycosides.

Keywords: amino acid, foliar spraying, glutamic acid, *Stevia rebaudiana*.

[4] Former MSc student, Associate and Assistance professors, respectively. Department of Horticulture, Faculty of Agriculture, University of Zanjan, Zanjan-Iran.
[5] Research Institute of Modern Biological Techniques (RIMBT), University of Zanjan, Zanjan- ran.
*Corresponding author, Email: asoleomani@znu.ac.ir

Comparison Growth Indices and Phenolic Compounds of *Stevia rebaudiana* growing at Greenhouse and Field Conditions

Roya Javadi[6], Ali Soleimani[1*], Ali Ammarlou[7] and Azizollah Kheiri[1]

Abstract

Comparison growing traits, phenol and flavonoids of stevia under field and greenhouse growth conditions were done during 2020-2021. In the field, plants were cultivated in five rows of 10 plants in each, and at the same time 20 potted plants were transferred into greenhouse Irrigation in the field treatment was drip. with controlled temperature and humidity. Greenhouse temperature between 25-30 degrees and humidity of 70 percent was set. The results of comparison of cultivation of this plant under field and greenhouse conditions showed that in field treatment, the highest mean values shoot height (67.75 cm), number of leaves (96.8), fresh weight of leaves and stems (0.213 and 15.23 g) and dry weight of leaves and stems (0.0607 and 5.5). The highest mean height (38.76 cm), number of leaves (69.25), fresh weight of leaves and stems (0.167 and 5.302 g) and dry weight of leaves and stems (0.0198 and 1.590 highest mean values in greenhouse treatment. On the other hand, in greenhouse g) were treatment, the highest mean values of leaves phenol (353.043 mg/g FW) and flavonoids (242.412 mg/g FW) and in field treatment had the highest mean values of leaves phenol (304.652 mg/g FW) and flavonoids (234.412 mg/g FW). Generally, farm cultivation showed a positive effect on growth indices, and growing at greenhouse was favorable for accumulation of phenols and flavonoids in this valuable medicinal plant.

Keywords: flavonoid, greenhouse, phenol, *Stevia rebaudiana*.

[6] Former MSc student, Associate and Assistance professors, respectively. Department of Horticulture, Faculty of Agriculture, University of Zanjan, Zanjan-Iran.
[7] Research Institute of Modern Biological Techniques (RIMBT), University of Zanjan, Zanjan- ran.
*Corresponding author, Email: asoleomani@znu.ac.ir

Different extraction techniques used for identifying of volatile compounds of *Satureja bachtiarica* bunge

Mohammad Hadi Meshkatalsadat

Department of chemistry, Qom university of technology, Qom

meshkatalsadat.m@qut.ac.ir

Abstract

Three different methods: hydrodistillation (HD), microwave-assisted hydrodistillation (MAHD) and Ultrasonic assist with headspace solid phase microextraction (UA-HS-SPME) accompanied with gas chromatoghraphy-mass spectrometry (GC/MS) have been applied for the first time together for extraction of volatile organic compounds of *Satureja bachtiarica* Bunge from Iran. Different experimental parameters such as the type of coating used for the fibers, sonication time, extraction time, temperature, and desorption time were optimized. The extraction time using the MAHD is no more than 24 min using a microwave power of 300 W. In the presence of UA-HS-SPME, the highest extraction efficiency was achieved with a 100 µm polydimethylsiloxane (PDMS) fiber. Different experimental parameters such as fiber's coating type, sonication time, extraction time and temperature, and desorption time were investigated. Carvacrol was as major component by three methods of HD (64.31%), MAHD (54.04%) and UA-HS-SPME (77.13%), respectively. The essential oil obtained with MAHD method contained substantially higher amounts of oxygenated compounds and lower amounts of monoterpenes than conventional method.

Keywords: *Satureja bachterica* Bunge, Volatile Compound, Hydrodistillation, Microwave Hydrodistillation, Solid phase Microextraction, Gas Chromatography–Mass Spectrometry

Determination of essential oil compounds of *Achillea milleolifium* extracted using different distillation methods

M.H.Meshkatalsadat
Department of chemistry, Qom University of technololgy, Qom
Meshkatalsadat.m@qut.ac.ir

Abstract

Three different methods: hydro distillation, microwave-assisted hydrodistillation and Ultrasonic assist with headspace solid phase microextraction have been applied for the first time together for the extraction of volatile organic compounds of *Achillea millefolium* L from Iran. The oils obtained were analyzed by GC–MS. The extraction time while using the MAHD is no more than 24 min using a microwave power of 300 W. In the presence of Ultrasonic assist with headspace solid phase microextraction (UA-HS-SPME), the highest extraction efficiency was achieved with a 100 µm polyd imethylsiloxane fiber. Different experimental parameters such as fiber's coating type, sonication time, extraction time and temperature, and desorption time were investigated. The major component by three methods of HD, MAHD and UA-HS-SPME were carvacrol as 64.31%, 54.04% and 77.13% respectively. Differences were observed both in the composition of the essential oil and from the energetic point of view.

Keywords: Solid phase microextraction; *Achillea millefolium* L*;* microwave hydrodistillation; Gas chromatography–mass spectrometry

Volatile components of *Thymus* species using HD and GC/MS

Mohammad Hadi Meshkatalsadat

Department of chemistry, Qom university of technology, Qom

meshkatalsadat.m@qut.ac.ir

Abstract

This paper is devoted to an investigation carried out on the essential oils of air-dried leaves of four species of Thymus Sp.: *Thymus. Persicus, Thymus Eriocalyx Thymus daenensis subsp. Daenensis, and Thymus serpyllum L* growing wild in Lorestan area, in the western part of Iran. The species were obtained through hydro-distillation process and analyzed by using GC and GC/MS methods. The four species were compared to determine the similarities and differences among their volatile chemical compositions. Sixty-five compounds representing 98.05%, 89.70%, 96.45% and 93.08% of essential oils were identified respectively. The major constituents noted were as *Thymus daenensis subsp. Daenensis*: Trans Ocimene (6.62%), 1, 8 Cineole (6.17%), cis sabinene hydrate (9.2%), Linalool (5.15%), α-Terpineol (13.18%), Thymol (5%), Caervacrol (12.38%), β-Carryophyllene (4.26%). *Th.Eriocalyx*: 1-Borneol (10.46%), Thymol (66.34%), Carvacrol (7.5%) *Th.Percicus*: 1,8-Cineole (5.24%), Limonene (11.62%), γ-Terpinene (5.63%), trans_Sabinene hydrate (7.78%), Thymol (10.38%), Carvacrol (25.71%) .*Th.Serpyllium*: α-Pinene (12.2%), Thymol (7.39%), Carvacrol (14.94%). The

complex array and differing abundances of these compounds among the *thymus* species under the investigation suggest that they may provide useful characters in understanding the phylogenetic relationships among closely related species.

Keywords: *Thymus* Essential oil; Thymol; Carvacrol, Labiatae gc/ms

Importance and effect of organic fertilizers in saffron cultivation (*Crocus sativus* L.)

Mina Amani*[1], Mohammad Ebrahim Ramazani, Yeganeh Naderi Tavabeh

1*. Master student of Horticultural Science and Engineering, Medicinal Plants, Faculty of Agriculture, University of Tabriz, Tabriz, Iran.

Abstract

In saffron production areas, in addition to climatic and soil factors, a series of agricultural issues such as field age, cultivation method, irrigation method and intervals, planting date, corm density, planting depth, corm size, nutrient management, grass control Weeds, growth regulators, harvesting and post-harvest management must also be optimized to have the most efficient effect on the quantity and quality of saffron produced. Uncorrect use of chemical fertilizers and many problems the environment caused by the use of these fertilizers on the one hand and the lack of extensive roots, the absorption of nutrients in late february in the leaves and stems of saffron on the other hand, the use of soluble fertilizers in Iranian farms on the agenda, since saffron is propagated by mastic, a major limiting factor in saffron cultivation is the difficulty of obtaining high-quality pistachios for propagation. Therefore, the production of strong maize stems through proper nutrition has always been considered and foliar application of nutrients is one of the auxiliary methods in plant nutrition.

Keywords: Coriander, Leaf nutrition, Saffron, Micronutrients, Medicinal plant

The effect of different soil textures on growth and essential oil content of *lippia Citriodora*

Hakimzadeh Mohammad Ali[*8], Mina Haghjoo[9], Motahareh Esfandiari[10], Gholamhosein Moradi[11]

Abstract

Soil physical properties are important because of their essential role in supporting plant growth. These characteristics determine how the plant interacts with the soil, water and nutrient uptake, root penetration, soil temperature and activity of microorganisms. Among the physical properties of soil, soil texture has a significant impact. On the other hand, with the increase in population and the urgent need of the pharmaceutical industry for medicinal plants as a raw material for drug production, attention and research on the *Lippia citriodora* plant are essential. This study aimed was to investigate the effect of different soil textures on the growth and essential oil content of lemons in order to select the best soil texture for cultivation and essential oil production in greenhouse conditions. For this purpose, the experiment was performed in a completely randomized block design with three replications in a pot. The experimental treatments included four types of loam, sandy loam, sandy and silty clay soil textures. After full growth of the plant *Lippia citriodora*, the amount of essential oil of the plant was measured the hydrodistillation method. The results showed that the most suitable soil for planting lemons is loamy, soil texture which is not significantly different from loamy sandy soil texture and in terms of the amount of essential oil of this plant in sandy soil texture has the highest percentage of essential oil (69%). However, since the leaf produced in loamy soil is more than its amount in sandy texture, so in each plant base, *Lippi acitriodora* in loamy soil, a higher percentage of essential oil is produced.

Keywords: soil texture, Lippia citriodora, essential oil.

[8] *Corresponding Author, Associate Professor, Faculty of Natural Resources, Yazd University, Yazd, Iran. Email: hakim@yazd.ac.ir
[9] MSc. Student of Desert Management, Faculty of Natural Resources, Yazd University, Yazd, Iran.
[10] Postdoctoral Researcher in Combat Desertification, Department of Natural Resources & Desert Studies, Yazd, Iran
[10] Assistant Professor, Faculty of Natural Resources, Yazd University, Yazd, Iran.

Investigation of the relationship between Soil factors and *Suaeda aegyptiaca* medicinal plant oil

Mohammad Mehdi Khalaj[12], Gholamhosein Moradi[13] , Mohammad Ali Hakimzadeh Ardakani[14]

Abstract

Soil variations study is an excitingtopic for ecologists. Relationships among theecosystem ecological variables are very essential for management, restoration, and development of vegetation cover in similar regions. Therefore, research on dry and semi-arid ecosystems is very important for increasing vegetation cover. Hence, the vegetation-environment relationship has always been an essential concept in ecology. To conduct this research, two *Suaeda aegyptiaca* sites were selected in central Iran (Neyriz) and, three transects were taken in each site. The transects were 500 meters long and 100 meters far from each other. The plots, area in each site was determined by the minimum surface method using a nested plot technique and area/species curves. Then, to do the same analysis for two sites and achieve greater accuracy, we considered the area of the plots to be greater than the minimum area. Soil samples were collected from 0–30 and 30–60 cm the depth in each plot. These depths were selected based on depth of plant species roots in the study area and previous researches. XLSTAT program and Principal components analysis (PCA) was used to investigate the main environmental factors related to the variation in *Suaeda aegyptiaca* distribution. The results showed that the amount of *Suaeda aegyptiaca* oil had a high correlation with carbon and had a positively correlated with the amount of sand, phosphorus and nitrogen. However, it has a negatively correlates with electrical conductivity(EC), silt percentage, C/N, calcium carbonate and, soil pH.

Keywords: *Suaeda aegyptiaca*, Soil factors, medicinal plant, Neyriz

[12] MSc. Student of Desert Management, Faculty of Natural Resources, Yazd University, Yazd, Iran.
[13] Assistant Professor, Faculty of Natural Resources, Yazd University, Yazd, Iran.
[14] *Corresponding Author, Associate Professor, Faculty of Natural Resources, Yazd University, Yazd, Iran. Email: hakim@yazd.ac.ir

Effects of different Ecotype and mother corm weight on growth and yield of saffron

Motahareh Esfandiari[15], Hakimzadeh Ardakani Mohammad Ali*[16]

Abstract

Saffron (*Crocus sativus* L.) is a plant of the Iridaceae family with various medicinal properties. Due to the increasing demand and limited land, new cultivation techniques are used to produce this medicinal plant, aeroponic cultivation. Increasing density per unit area, managing nutrition and, environmental conditions, easy harvesting and reducing human resources compared to soil crops. In this study, saffron corms were prepared from several cities of Mishkan (Fars), Birjand (Khorasan), Dashte Chenar (Yazd) and Ardabil for cultivation in the aeroponic system; Considering the weight of mother corm in three sizes: large (9-13 gr), medium (4-9 gr), and small (less than 4 gr), their performance was evaluated. which were three replications. The measured traits included a number of flowers, flower yield, fresh and dry weight of the stigma. The results showed that the type of ecotype had no significant effect on the number of flowers and flower yield, but the stigma yield in Yazd and Birjand ecotypes had a significant difference at the level of ($P \leq 0.05$). Regarding the effect of mother corm weight, all the studied traits had a significant effect, so that the highest number of flowers and stigma length were found in large corms, but the least of them were obtained from small ones.

Key word: Aaeroponic, Saffron(*Crocus sativus* L.), Corm, flowering, stigma.

[15] Postdoctoral Researcher in Combat Desertification, Department of Natural Resources & Desert Studies, Yazd, Iran
[15] *Corresponding Author, Associate Professor, Faculty of Natural Resources, Yazd University, Yazd, Iran. Email: hakim@yazd.ac.ir

Truffle Producing Orchads : a solution to reduce the effects of climate change and soil pollution

Tahereh Borna

Graduate of biotechnology and molecular genetic of horticulture crops. University of Tehran, Expert of Department of Environment

Abstract

Water scarcity, climate change or global warming, and soil pollution are three major environmental challenges facing humans in the world. Evidence suggests that global climate change will affect many of Iran's agricultural climatic variables over the next few decades. However, few studies have been conducted on its effects on crop production nationally. Soil is involved in every aspect of life including food, water, air and health. The Food and Agriculture Organization of the United Nations (FAO) estimates that 95% of our food production is directly and indirectly related to soil. Accordingly, soil pollution is a real and very serious health risk. In the northern provinces of Iran, due to the fact that the main occupation of the people is agriculture, on the other hand, the existence of environmental problems such as landfills, urban and industrial wastewater, the soil is severely polluted. Therefore, soil conservation should be a priority in conservation programs. Truffles are hypogeous fungi which live in symbiosis with plant host roots in order to accomplish their life cycle. Some of the truffle species are highly prized as food. This has led to the illegal harvesting of truffles from the Hyrcanian forests over the past decade and subsequent damage to these forests. symbiotic relationship between Ectomycorrhizal fungus (Tuber spp.) and a host plant (Pine, oak, hazelnut and etc) are considered as a solution for soil pollution and climate change in sustainable agriculture for our future. Truffle producing orchards preserve forested lands which prevent soil erosion, pathogenic organism proliferation, and promote overall land conservation. Cultivation of truffles can be a good option to help farmers and local communities, as well as to protect the soil and adapt to climate change. This article reviewed the possibility of producing commercial numbers of Tuber-mycorrhized trees for truffle cultivation.

Keywords: Truffle producing orchads, climate change, soil pollution

The industry of medicinal plants and its effects on the environment with an approach to global declaration of environmental laws

Mohsen Ammarelo[1*] & Ali Babayee Mehr[2]

1: Ph.D student in Public Law, Islamic Azad University, Sari Branch, Sari, Iran

2: Assistant professor of public law department, Islamic Azad University , Chalus , Iran.

Abstract

Iran based on climatic and geographical conditions has a wide range of medicinal plants diversities and in the past is the source of consumption and usage of pharmaceutical plants as an ancient folklore. Therefore , in addition to the growing importance of pharmaceutical plants usages and demands at the world level, which rapidly replaces many chemicals traits, the exports of these plants can also be an important source of exports exchange revenues. It is important to say that the exploitation of natural fields and in other words natural resources in most parts of the world is wide spread, easy and somewhat uncontrollable. Improper collection of these valuable plants from natural areas causes irreparable damage on the body of nature and the environment. The increased growing world need of pharmaceutical factories to the raw material and the necessity of preservation of natural plant resources is an issue that makes the importance of studying in this subject. It can be said that one of the major challenges in the industry of medicinal plants is conservation of environmental rights and prevention of pollution caused by destructive industries which is dependent on it. Important world statements such as Stockholm , 1972 , Rio 1992 and Johannesburg , the London Convention of the 1990 s , the Kyoto Convention , the 2015 Convention of the International Trade and Climate Convention , and , in particular , the Convention on the International Trade of fauna and the wild plants at the risk of extinction and destruction (1973) are samples of world tries for support of nature. In this study, we have discussed the importance of developing the medicinal plant processing industry in terms of the rule of environmental laws and regulations in this area.

Key words : Medicinal plants , Environment protection, International agreements.

Investigating the role and effectiveness of international organizations and treaties on world Ecology protection

Mohsen Amarlou[1*] , Ali Akbar Nosrati2 and Roya Rouhani[3]
1.Ph.D Student in Public Law, Islamic Azad University, Sari Branch, Iran
2. Ph.D Student in Public Law, Islamic Azad University, Sari Branch, Iran
3. Master Science of Public Administration, Zanjan, Iran.

Abstract:

Given the growing pollution and degradation of the environment and world ecology, resulted as the emergence of successive environmental crises, the world governments decided to prevent further environmental degradation from about five decades ago and numerous international organizations and treaties were concluded. So far, about 280 international and regional treaties and agreements in the field of environmental protection and related issues have been concluded, of which about 70 treaties (conventions) and annexes (protocols) have a global aspect and the rest are regional. The serious global commitment to environmental protection became concrete with the convening of the first United Nations World Conference on Human and Environment, known as the Stockholm Pact, on June 5, 1972, in Stockholm, Sweden. So that the right of human beings to enjoy a healthy environment was recognized as equal to human rights And it can be said that the best argument for establishing the International Court of Environment as one of the international institutions in this regard is to monitor and deal with environmental aggressors. However, many environmental regulations and treaties are considered by governments to be ceremonial and unethical. With the convening of the Earth Conference in 1992 in Rio de Janeiro, Brazil (known as the Rio Conference) and the adoption of the Rio Declaration on 27 Principles, a new chapter in international cooperation for the protection of the environment was opened. The purpose of those conferences was to support governments and nations in their public efforts to protect the human environment and to improve the use of all their buildings and descendants. The findings of this study will show well that today in the field of environmental protection, many conventions and global and regional environmental treaties have been developed that play a key role and place in the protection of the human environment, sometimes some of these treaties. Taking into account the descriptive view in this research, while strengthening international convergence by creating international organizations and treaties and highlighting their role in this; to achieve environmental protection as a necessary value and policy framework and a serious priority step and draw a basic strategy to control environmental hazards and an effective approach to balance sustainable development.

Keywords: Ecology, Convention, Environment protection, International organizations.

Comparative evaluation of free radical scavenging in some Iranian populations of *Anthemis cotula*

Jafari, F.; Fatemi, M.*; Haddadchi, G.R.

Department of Biology, Faculty of Sciences, Golestan University, Gorgan, Iran

* Corresponding author: s.m.fatemi@gu.ac.ir

Background: *Anthemis cotula* L. is an annual plant which is considered as an inferior form of chamomile. It is widely spread through human activities and considered as weed in many areas of the world. Presence of secondary products such as phenols and flavonoids in the leaves, stems and inflorescences of the plant gives medicinal properties to it. Free radical scavenging properties of these secondary metabolites may play a role as anti-cancer agents or be beneficial to the cardiovascular system.

Aims: we aimed to compare the level of free radical scavenging in plant specimens from different populations.

Methods: Samples from five natural habitats in the Zagros region in Iran were collected and dried. Methanol was used as a solvent to extract secondary products using a Soxhlet extractor and rotary evaporator. 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay was used to assess the antioxidant activities of the plant extracts.

Results: Radical scavenging activities differed significantly in samples from different habitats. The highest level of antioxidant activities were recorded in the Baghmalek population in Khuzestan province.

Conclusions: Various environmental factors as well as genetic and morphogenetic biosynthesis and accumulation of secondary metabolites. Thus plants collected from different habitats may not have the same medicinal properties.

Keywords: Mayweed, radical scavenging, chamomile, Anthemis cotula, antioxidant activities

Evaluation of phytochemical variation and antioxidant activities of *Capparis spinosa at* different phenological stages

Saeid Hazrati[a], Saeed Mollaei[b] and Hossein Rabbi Angourani[c]

[a]Faculty of Agriculture, Azarbaijan Shahid Madani University, Tabriz, Iran.

[b]Phytochemical Laboratory, Department of Chemistry, Faculty of Sciences, Azarbaijan Shahid Madani University, Tabriz, Iran

[c]Research Institute of Modern Biological Techniques, University of Zanjan, Zanjan, Iran

Abstract

Medicinal plants have different capacities to produce natural compounds at different phonological stages. To achieve their goal, breeders must consider the proper harvest time to reach the best yield for their target purposes, such as pharmaceutical, food, and cosmetic industries applications. For this reason, total phenol and flavonoid contents as well as antioxidant activity were studied in different phenological growth stages of *C. spinosa*. Total phenols and flavonoids of the extracts were determined using Folin- Ciocalteu and aluminum chloride methods. Also, the DPPH assay was used to predict antioxidant activities of the extracts. Statistical analysis of this experiment showed that the greatest total phenolic content was observed at the pre-flowering stage (57.33 mg GAL/g of extract), while the minimum amount was associated with the mide-mature fruit stage (fruit) (13.97 mg GAL/g of extract). The study on the flavonoid content indicated that the late-mature fruit stage (leaf) resulted in maximum flavonoid content followed by late-mature fruit stage (friut) (16.64 and 13.72 mg QE/g of extract, respectively). The antioxidant results revealed that the highest antioxidant properties were obtained in the Late-mature fruit stage (leaf) with IC50 value of 241 µg/mL, and the full-flowering stage (flower) and mide-mature fruit stage (fruit) had the lowest antioxidant activity with IC50 value of up to 1000 µg/mL. The results of the present study introduced *C. spinosa* as a rich source of phenolic compounds in all growing stages, and its highest value was obtained in the pre-flowering stage.

Keywords: Antioxidant, *Capparis spinosa*, Flavonoid, phenol

Antidiabetic activity of Ethanolic extract of *CALAMUS ROTANG* LINN leaves

Nastaran Khojastehpour[1]*, Mohammad Naseri[2], Dr.V. Kishorkumar[3]

[1] Pharmacy student at JKKN college of pharmacy, Dr.MGR university, India (n.khojastehpour@gmail.com)
[2] Pharmacy student at JKKN college of pharmacy, Dr.MGR university, India (naseri70@gmail.com)
[3] M.Pharm., Ph.D., Professor at department of pharmacognosy, JKKN college of pharmacy, Dr.MGR university, India

Abstract

The plant Calamus rotang linn belonging to the family of Arecaceae is claimed to have medicinal uses such as astringent, antidiarrhoeal, anti-inflammatory, tumours, convulsions and diabetes. The purpose of the present study was to assess the antidiabetic effect of EECRL on normal and diabetic rats.

The preliminary phytochemical studies indicate the presence of carbohydrates, alkaloids, saponins, flavonoids, tannins & phenolic compounds.

The Oral administration of EECRL 100, 200 mg/kg to the diabetic rats significantly reduced blood glucose level by STZ-NC induced rat model. The body weigh also restored to normal level. Histopathology of pancreas shows marked proliferated and regenerated β-cells in EECRL treated rats. All the above parameters were comparable to the standard drug glibenclamide.

Hence, above findings have given scientific evidence to the traditional use of Calamus rotang linn leaves in the treatment of diabetes. Further studies are required to identify the active constituents and to work out exact mechanism of action involved in antidiabetic potential.

Keywords: Calamus rotang, astringent, alkaloids, antidiabetic, blood glucose.

The effect of Trichoderma on the growth and nutrition of medicinal plants

Mina Amani*[1], Fatemeh Rafighzadeh[2], Saeideh Alizadeh Salteh[3]

1*. Master student of Horticultural Science and Engineering, Medicinal Plants, Faculty of Agriculture, University of Tabriz, Tabriz, Iran.

2. Master student of Horticultural Science and Engineering, Medicinal Plants, Islamic Azad University, Science and Research Branch, Tehran, Iran.

3. Associate Professor, Department of Horticultural Science and Engineering, Medicinal Plants, Faculty of Agriculture, University of Tabriz, Tabriz, Iran.

Abstract

Trichoderma species increase plant growth under certain mechanisms. Among the mechanisms mentioned are the biological control of soil diseases by enzyme secretion, production of antibiotics and penetration into the body of pathogenic fungi, detoxification and increased transfer of sugar and amino acids in plant roots. Induction resistance to environmental stresses, increase nutrient uptake by increasing solubility of elements, secretion of growth hormones and hormone-like and production of xylanase and cellulase enzymes that can directly produce ethylene in the plant In response to the presence of a pathogen to stimulate, he noted. All of these mechanisms ultimately increase nutrient uptake and ultimately the development of the root system. Various factors affect the effectiveness of trichoderma. The type of isolates and even different species of Trichoderma as well as the methods of application of Trichoderma can have different effects on traits and growth factors.

Keywords: Trichoderma, biofertilizers, plant growth and nutrition.

Nutritional and therapeutic importance of oyster mushroom (*Pleurotus eryngii*)

Mina Amani*[1], Fatemeh Rafighzadeh[2], Saeideh Alizadeh Salteh[3]

1*. Master student of Horticultural Science and Engineering, Medicinal Plants, Faculty of Agriculture, University of Tabriz, Tabriz, Iran.

2. Master student of Horticultural Science and Engineering, Medicinal Plants, Islamic Azad University, Science and Research Branch, Tehran, Iran.

3. Associate Professor, Department of Horticultural Science and Engineering, Medicinal Plants, Faculty of Agriculture, University of Tabriz, Tabriz, Iran.

Abstract

One of the most important members of the oyster mushroom family is a special fungus called the edible king oyster mushroom (*Pleurotus eryngii*) with the scientific name of Pleurotus. This fungus has many medicinal properties such as antihypertensive, antioxidant, anti-cholesterol, anti-hyperglycemic, immune-boosting, anti-tumor, anti-bacterial, anti-viral, anti-fungal, anti-inflammatory and anti-osteoporosis. A compound called aringeolysin has been identified in oyster mushroom that inhibits the proliferation of leukemia cells. The fruit of the oyster mushroom is rich in carbohydrates, dietary fiber, chitin and polysaccharides. Aspartic acid, glutamic acid and arginine are the three most abundant amino acids in Erinji. The fruit of the oyster mushroom is a good source of vitamins A, B and D and minerals, especially potassium, magnesium, sodium and calcium.

Keywords: *Pleurotus eryngii*, Medicinal properties, nutritional application

Aqueous Alcoholic Extraction of Medicinal and Aromatic Plants by Fermentation

Mina Amani*[1], Fatemeh Rafighzadeh[2], Saeideh Alizadeh Salteh[3]

1*. Master student of Horticultural Science and Engineering, Medicinal Plants, Faculty of Agriculture, University of Tabriz, Tabriz, Iran.

2. Master student of Horticultural Science and Engineering, Medicinal Plants, Islamic Azad University, Science and Research Branch, Tehran, Iran.

3. Associate Professor, Department of Horticultural Science and Engineering, Medicinal Plants, Faculty of Agriculture, University of Tabriz, Tabriz, Iran.

Abstract

The history of the development of pharmaceutical dosage forms can be traced back to the Vedic era. It provides insight into the innovations made during ancient times when the crude herbs were initially used in powder form and later on they were used as decoctions, self-fermented products, paste, pills and other advanced dosage forms. New drug development involves the search for novel and new pharmacophores. Combinatorial chemistry cannot solve the problem in a satisfactory manner nor can the reductionist approach be applied to medicinal plants. Asava arishta, a fermented Ayurvedic product, is a good source of novel pharmacophores for new drug discovery.

Keywords: Medicinal plants, Traditional medicine, Pharmacy

Quantitative and Qualitative analysis of Rutin and Quercetin in *Lycium barbarum* L. plant using HPLC-PDA and determining the amount of Total Phenols and Flavonoids in hydroalcoholic extract

Mehrdad Kashefi, Fatemeh Tajabadi, Seyed Vahid Ghasemi, Reza Hajiaghaee, Meraj Najafi

Medicinal Plants Research Center, Institute of Medicinal Plants, ACECR, Karaj, Iran

*Corresponding author: Medicinal Plants Research Center, Institute of Medicinal Plants, ACECR, 55th Kilometer of Tehran-Qazvin Freeway, Karaj, P.O.Box: 31375-1369, Iran
Tel: +98-26-34764010-19, Fax: +98-26-34764021
E-mail: Mehrdad.kashefi1982@gmail.com

Abstract

Background: *Goji berry* is a scientific name (*Lycium barbarum* L.) from Solanaceae family which has been widely used in traditional medicine.
Objective: The main objective of this study was to develop a novel method using HPLC to measure the amount of rutin and quercetin flavonoids. Also, considering the reported medicinal properties of leaf and fruit of *Lycium barbarum* and its commerciality and reports of significant amounts of phenol and flavonoids in the leaves of the plant, the total content of these compounds in the fruit of the plant were also measured (phenols and flavonoids).
Results: The results were reported based on HPLC data for the two rutin and quercetin 842 ± 1.2 µg/g plant and 22 ± 1/3 µg/g plant, respectively.
The spectrophotometric method was used to determine the total amount of 80% methanolic extract of phenol and flavonoid extract 12.92 ± 1.97 mg Gallic acid/g plant and 3.71 ± 0.56 mg Rutin /g plant, respectively.
Conclusion: According to HPLC data, the presence of flavonoids of rutin and quercetin in the hydroalcoholic extract of the fruit of the plant were reported and their quantities were reported for first time. The new HPLC method used for these two compounds showed its effectiveness in the measurements. Determination of total phenol and flavonoid amounts showed significant presence of these compounds.

Keywords: Goji berry plant, Hydroalcoholic extract, HPLC, Total Phenols and Flavonoids

An examination of antibacterial properties and chemical profile of methanolic extract of *Agaricus bisporus* wild edible mushroom, Zarnagh region (East Azerbaijan province, Iran)

Ghodsieh Bagherzade,[1] Amin Nameni,[1,*] Pouya Ghamari Kargar[1]

[1]*Chemistry Department, Birjand University, Birjand, Iran*

E-mail: amin.nameni94@gmail.com

Abstract

There are many studies on cultivated and wild mushrooms in the world, but there is little information about phytochemical properties and antibacterial activities of wild edible mushrooms of Iran. This work is to our best knowledge of the biological properties of the native fungus in the Zarnagh region (East Azerbaijan province in northwestern Iran). This region is known for the variety of its soils and diversity of climatic conditions. This variability assumes an important role in mushroom production and thus, Zarnagh is recognized as one of the richest regions in wild edible species in Iran. The methanol extracts of *Agaricus bisporus* mushroom (maceration extraction method), was screened for phytochemicals and biological properties, using standard analytical methods with the aim of assessing their health promoting properties. The results of physicochemical and nutritional factors include crude protein (46.62 ± 0.19 g/100g), crude fat (10.59 ± 0.13 g/100g), crude fiber (17.76 ± 0.32 g/100g), carbohydrate (1.56 ± 0.27 g/100g) and total energy (288.3 ± 2.61 Kcal). Copper, iron, calcium, phosphorus, sodium and potassium in substantial quantities were detected in the mushrooms. The phenolic compounds (rutin, myricetin, quercetin, kaempferol), identified by High performance liquid chromatography coupled to ultraviolet detector (HPLC-UV) analysis. The methanolic extracts was evaluated by Gas Chromatography Mass Spectrometry (GC-MS), analysis. We report a screening of antibacterial activities by using one Gram Positive (*Staphylococcus aureus*) and two Gram negative bacteria (*Escherichia coli* and *Pseudomonas aeruginosa*) performed for this important wild edible mushroom species from northwestern Iran. In addition, the antibacterial assay was carried out by agar well diffusion method.

Keywords: Wild edible mushroom, methanolic extract, phytochemical investigation, Antimicrobial activities, GC-MS, HPLC-UV

Flavonoid constituents and chemotypes of the genus *Teucrium* L. (Lamiaceae); section *Polium* from Zagros region, Iran

Seyed Hossein Bagheri Moghadam [1], Navaz Kharazian [1*]

[1] Department of Botany, Faculty of Sciences, Shahrekord University, Shahrekord, Iran

[*]Email:nkharazian@gmail.com

Abstract

The genus *Teucrium* L. (Lamiaceae family; Ajugoideae sub-family) is a well-known medicinal plant with a rich source of secondary metabolites. The current research attempts to elucidate the flavonoid compounds, chemotypes and specific markers of *Teucrium*; section *Polium*. In this section, 29 accessions belonging to three species were collected from center, west, south and southwest of Zagros regions. The total flavonoid was obtained from air-dried leaves using 90% MeOH and purified by $CHCl_3$-MeOH 60:40 and column chromatography. Consequently, nine fractions were analyzed using HPLC-MQ-API-MS/MS. The mass spectrometer was recorded on negative ionization mode. The results of this research showed 30 chemical compounds including flavonoid, quinic acid, and phenylpropanoic acid derivatives. Furthermore, specific flavonoid markers were recognized for each species containing 17 markers for *T. capitatum*, 6 markers for *T. gnaphalodes* L.' Her, and 2 markers for *T. polium* L. Some of the flavonoid markers were attributed to isorhamnetin-*O*-di-glucoside (*T. polium*), myricetin-tetramethylether (*T. gnaphalodes*), and afzelin-*O*-di-hexoside (*T. capitatum*). Moreover, six chemotypes were observed in section *Polium*, considerably showing the spatial segregation in natural habitats. It was concluded that two geographical regions, namely Isfahan and Boyerahmad had a high chemical divergence. Consequently, the flavonoid constituents identified by HPLC-MS/MS are suitable for pharmaceutical and phytochemical purposes.

Keywords: chemical markers, flavonoid, HPLC-MS/MS, Lamiaceae, *Teucrium*

Mycorrhizal fungi modified growth, physiological traits, and essential oil content of sweet basil

Leila Mehdizadeh[1], Sara Farsaraei[1], Mohammad Moghaddam[1]*

[1]Department of Horticultural Science and Landscape Engineering, Faculty of Agriculture, Ferdowsi University of Mashhad, Mashhad, Iran.

*Corresponding author: E-mail: m.moghadam@um.ac.ir; moghaddam75@yahoo.com

Abstract

Arbuscular mycorrhizal fungi (AMF) are a vital component of the belowground system and their effect on the growth, yield, and secondary metabolite content of the plants and sustainable agricultural systems has been largely noticed (Heydarizadeh et al., 2013; Urcoviche et al., 2015). Mycorrhizal fungi help plant different species to uptake water and nutrients and make physiological changes to increase the growth and productivity of the plants (Weisany et al., 2015). The present study was aimed to evaluate the effect of two types of mycorrhizal fungi on some growth and physiological characteristics of sweet basil (*Ocimium basilicum* L. cv. Keshkeni Luvelou) as well as essential oil content. Therefore, a pot experiment based on a completely randomized design with four replications was performed in the greenhouse of Ferdowsi University of Mashhad, Iran, which comprised *Claroideoglomus etunicatum* and *Funnetiformis mossea* mycorrhizal fungi and control. The results of this study indicated that mycorrhizal fungi application improved the growth and physiological traits of sweet basil as well as essential oil content. The highest plant height, leaves and aerial part biomasses, chlorophyll a, chlorophyll b, total chlorophyll, carotenoids, total phenols, antioxidant activity were obtained by using *Rhizophagus intradices*. While the application of *Funnetiformis mosseae* showed the highest total soluble sugar and essential oil content. In conclusion, the findings of this experiment indicated that mycorrhizal fungi application can improve the growth and modify physiological parameters of the plants. Moreover, it may be possible to use mycorrhizal fungi to affect the essential oil content of the medicinal plants. In addition various responses of plant characteristics observe based on the fungi species.

Keywords: Antioxidant activity, Essential oil content, Growth, Photosynthetic pigments, Sweet basil

Response of *Ocimum ciliatum* L. to biochar amendment under cadmium stress

Sara Farsaraei[1], Leila Mehdizadeh[1], Mohammad Moghaddam[1*]

[1]Department of Horticultural Science and Landscape Engineering, Faculty of Agriculture, Ferdowsi University of Mashhad, Mashhad, Iran

* Corresponding author: E-mail: m.moghadam@um.ac.ir; moghaddam75@yahoo.com

Abstract

Cadmium (Cd) contamination in agricultural soils has become one of the most widespread and severe environmental and agricultural problems in Asian countries (Mori et al., 2016). There are different methods to decrease the harmful and toxic effects of heavy metals in plants. Organic additives such as biochar (BC) have been exposed as highly effective and environment-friendly immobilizers to decrease Cd concentrations (Hamid et al., 2020). BC is a black porous carbon-rich compound that produced from the pyrolysis, thermochemical modification of a wide range of organic substances like agricultural wastes and woody materials at moderate to high temperatures in the absence or low oxygen conditions (Ali et al., 2017). BC application decreases trace element toxicity and enhances metal immobilization (Khan et al., 2020). Therefore, a pot factorial experiment based on a completely randomized design with four replications was performed to evaluate the effect of BC on growth, antioxidant enzyme activities, and Cd concentration of *Ocimum ciliatum* L. leaves under Cd stress. The experimental treatments comprised BC levels (0, 1, and 2% w/w of soil) and Cd concentrations (0, 20, and 40 mg/kg). According to the results of this study, the highest aboveground biomass was observed by using 2% w/w BC with no Cd. In addition, the highest malondialdehyde (MDA) content, cell membrane injury, guaiacol peroxidase (GPX), and ascorbate peroxidase (APX) activities were obtained in 40 mg/kg Cd with no BC treatment and using BC reduced them to mitigate negative impacts of Cd stress. On the other hand, the Cd concentration of the leaves decreased by using BC especially at 2% w/w of soil. In total, BC can apply as an environmental friendly amendment in contaminated soil to alleviate the harmful effects of Cd on the plants. Moreover, Cd concentration in the leaves reduces due to the absorption properties of BC.

Keywords: Basil, Biochar, Cell membrane injury, Malondialdehyde, Heavy metals

The effect of pinching and row spacing on biomass, essential oil content and composition of *Tagetes minuta*

Leila Mehdizadeh[1], Mohammad Moghaddam[1*]

[1]Department of Horticultural Science and Landscape Engineering, Faculty of Agriculture, Ferdowsi University of Mashhad, Mashhad, Iran.

*Corresponding author: E-mail: m.moghadam@um.ac.ir; moghaddam75@yahoo.com

Abstract

Tagetes minuta L. from the Asteraceae family is an annual perennial herb, important herbaceous aromatic essential oil plant species that grows wild from spring to early winter (Pandey et al., 2015). Pinching is the manual amputation of the growing tips of plants. The practice is managed commonly by preventing the influence of apical dominance, to promote the flourishing growth of the canopy (Kumar et al., 2014). Plant spacing is an effective factor in the quantity and quality of plant products that affect directly on plant growth and essential oil content. Therefore, a field experiment was conducted to study the effect of pinching and cultivation row spacing on biomass, essential oil content and composition of *T. minuta*. The treatments comprised of two pinchings (pinching and without pinching) and three row spacing (30, 40, and 50 cm). The findings of this experiment showed that the highest aboveground biomass, antioxidant activity, and essential oil content were observed in 50 cm row spacing with pinching. The oil analyses by GC and GC/MS resulted in the identification of 29 compounds representing 93.83-96.98% of the oil. The major constituents were dihydrotagetone (39.19%), β-ocimene (20.99%), tagetone (15.84%), limonene (7.04%), and (E)-ocimenone (6.32%). The highest percentage of each constituent were obtained in different treatment as following: dihydrotagetone in 40 cm row spacing without pinching, β-ocimene and limonene in 40 cm row spacing with pinching, tagetone and (E)-ocimenone in 50 cm row spacing without pinching. It can be concluded that essential oil content and composition are influenced by pinching and row spacing.

Keywords: Antioxidant activity, Dihydrotagetone, Essential oil compound, *Tagetes minuta*

Evaluation of Phenolic components of *Capparis spinosa* species in Iran

M. Keshavarzi[1 & 2]

1-Department of Plant Sciences, Faculty of Biological Sciences, Alzahra University, Tehran, Iran

2-Iran National Science Foundation (INSF)

* Correspondence author: m.keshavarzi@alzahra.ac.ir

Abstract

Capparis spinosa (Capparaceae) is effective in treating a wide range of diseases (Arena et al., 2008, Lam et al., 2009). This plant, which its fruits and buds are of edible and medicinal importance, is used in the treatment of hyperlipidemia and blood sugar, gastrointestinal infections, diarrhea, etc (Gadgoli & Mishra, 1999; Ahvazi et al., 2012). Numerous medicinal effects have been mentioned for it in the Mediterranean countries (Fici, 2001; Özcan, 2005). The bud, flower and fruit parts and its roots are used. In this study, phenolic compounds in three varieties of this plant as *Capparis spinosa* var. *macranthera*, *C. spinosa* var *parviflora* and *C. spinosa* var *spinosa* are compared. Samples were gathered from natural habitats and extracted. Studying by HPLC showed that in these three varieties there are cinnamic acid, 4-hydroxy-cinnamic acid, 4-chlorobenzoic acid and 4-hydroxybenzoic acid and coumaric acid in different amounts. These compounds are valuable in food flavoring and are used in the pharmaceutical and perfume industries. Cinnamic acid is a natural fatty acid that has been shown to play a known role in stopping malignancy of cancer cells in humans, especially lung and prostate cancer. Coumaric acid is also a phenolic compound. 4-Hydroxybenzoic acid that is present in this medicinal plant is a famous antioxidant with low toxicity. It has estrogenic activity. This xerophytic plant, that can tolerate low level of available water and different types of soils, has a reserve of valuable materials that in Iran's climatic conditions, its cultivation and reproduction provide a good opportunity for sustainable use of drugs.

Keywords: Capparis spinosa, Phenolic compounds, Iran.

Antiproliferative and apoptotic effect of Piper cubeba hydroalcoholic extract on the MCF-7 human breast cancer cell line

Tayebeh Mohammadi[1], Mehrdad Pooyanmehr [1] , Farhang Tafaroji[2]

1- Department of Basic and Pathobiology Sciences, Faculty of Veterinary Medicine, Razi University, Kermanshah, Iran.

2- Faculty of Veterinary Medicine, Razi University, Kermanshah, Iran

Abstract

Breast cancer is the most prevalent cancer and a death leading cause among women worldwide. Based on various former studies, herbs may play a significant role in cancer alternative therapy. This study aimed to evaluate the anti- proliferative and apoptosis inducing potential of Piper cubeba. Its anti-proliferative activity on the human breast cancer cell line (MCF-7) was measured by MTT assay and acridin orange-ethidiuum bromide (AO/ED) staining was used to examine its apoptotic effects phenotypically. The hydroalcoholic extract of Piper cubeba showed anti- proliferative effects in a dose and time dependent manner($P<0.05$). IC50 was 1 mg/ul. The anti proliferative activity was associated with an increase of apoptosis as demonstrated by AO/ED staining. Our findings showed anti proliferative and apoptotic effect of Piper cubeba fruit on human breast cancer cell line.

Key words: Piper cubeba, Breast cancer, MTT, viability.

Piper cubeba fruit extract has cytotoxic effect on normal cells

Tayebeh Mohammadi[1], Mehrdad Pooyanmehr[1], Ali Maleki[2], Farhang Tafaroji[3]

1- Department of Basic and Pathobiology Sciences, Faculty of Veterinary Medicine, Razi University, Kermanshah, Iran.

2- Department of Hematology, Faculty of Medicine, Kermanshah Medical Sciences University, Kermanshah, Iran.

3- Faculty of Veterinary Medicine, Razi University, Kermanshah, Iran.

Abstract

Piper cubeba or tailed pepper fruit is an antioxidant rich herbal source. So its effects on cancer cell types has been studied. In this study, its hydroalcoholic extract effect on human umbilical vein endothelial cell(HUVEC) as normal cells was examined. The cells were treated with increasing concentrations of extract of fruit for 24 h to determine IC50. Cell bio-viability was determined by MTT assay. Thereafter, the cells were treated with IC50 concentration for 3 and 5 days. Cell morphology and apoptosis were examined by Giemsa and acridine orange-ethidium bromide (AO/EB) staining. IC50 was determined. The extract reduced cell viability as a dose and time dependent manner significantly($P<0.05$). It changed cell morphology. Apoptotic changes were observed in nuclei. It seems the hydroalcoholic extract of Piper cubeba fruit has cytotoxic effect on normal cells and induces apoptosis which should be considered as a side effect.

Keywords: Piper cubeba, HUVEC, MTT, Viabilty, Apoptosis.

Common Mallow (Malva sylvestris L.): A valuable medicinal plant with potential applications in the food industry

Fatemeh Mojarradi[1]*, Mandana Bimakr[2], Ali Ganjloo[2]

[1] Msc student, Department of Food Science and Engineering, Faculty of Agriculture, University of Zanjan, Zanjan, Iran
[2]Associate Professor, Department of Food Science and Engineering, Faculty of Agriculture, University of Zanjan, Zanjan, Iran

Abstract

Malva sylvestris L. is one of the valuable medicinal plants in traditional medicine that have been used to treat many diseases. Free radicals and their adverse effects on food products and consumer health have always been considered as one of the most challenging issues for food industry researchers. Also, consumption of synthetic antioxidants in food products is limited due to their harmful effects on the human health. Bioactive compounds are one of the most valuable compounds that have been widely applied in the food industry. Therefore, the demand for identification of the plant resources rich in bioactive compounds and providing a suitable method for processing and recovery of these vital compounds is necessary. The application of modern extraction methods, such as ultrasound technology is a promising method to recover valuable bioactive compounds from medicinal plants such as *Malva sylvestris* L. In this review article, the biologically active compounds of this valuable medicinal plant was presented as new food ingredients. Furthermore, appropriate extraction methods to separate valuable bioactive compounds was also considered.

Keywords: *Malva sylvestris* L., Free radicals, Antioxidant, Food industry, Ultrasound technology.

Evaluation of Polyphenolic components of *Fallopia* (Polygonaceae) species in Iran

M. Keshavarzi[1] F. Ebrahimi[2]

1-Department of Plant Sciences, Faculty of Biological Sciences, Alzahra University, Tehran, Iran

2-Expert of Commenssion 7 / Municipality of Tehran, Tehran Parks & Green Spaces Organization

* Correspondence author: m.keshavarzi@alzahra.ac.ir

Abstract

Fallopia (Polygonaceae) with about 17 annual and perennial species, is of ornamental and weed importance. This genus is distributed in different parts of the world, including Eurasia. Its species are widely distributed as a weed in cultivations or disturbed areas in temperate regions of the world (Keshavarzi & Mosaferi, 2019). *Fallopia* has three species in Iran: *F. convolvulus*, *F. dumetorum* and *F. baldschuanica* (Mozaffarian 2012). *F. convolvulus* and *F. dumetorum* are famous weeds of different crops (FAO 2015), that act as a contaminating agent for seed resources (Holm et al. 1991). Seeds of these species are edible for their amino acid content. *Fallopia* species were considered as a food source in ancient times (Hanf 1990). *F. convolvulus* act as a bio-accumulator agent in polluted soils (Pedersen et al. 2000). Some of the *Fallopia* species has anticancer potential and acts as a natural modulator, that can overcome multidrug resistance of cancer cells. So, the extracts of these species are a good source of bioactive components (Olaru et al., 2015). In present study, polyphenolic compounds in three species of *Fallopia* in Iran are compared. Samples were gathered from natural habitats and extracted. Studying the crude extract by HPLC showed that in these three species there are cinnamic acid, 4-hydroxy-cinnamic acid, 4-chlorobenzoic acid and 4-hydroxybenzoic acid, rosmarinic acid and coumaric acid in different amounts. These polyphenolic compounds have a wide range of biological activities, and show antioxidant activity. Qualitative and quantitative differences of polyphenolics in three *Fallopia* species are discussed. These valuable components provide a chance to turn threats into opportunities for these weeds.

Keywords: Fallopia, Phenolic compounds, Iran.

Suppressive role of *Viola odorata* extract on malignant characters of mammospheres derived breast cancer stem cells.

Authors: Saghar Yousefnia[a], Danial Naseri[b], Farzad Seyed Forootan[b,c±], Maryam Tabatabaeian[d], Fariborz Moattar[e] , Taghi Ghafghazi[e], Mohammad Hossein Nasr Esfahani[b], Kamran Ghaedi [a,b†±]

[a]Department of Cell and Molecular Biology and Microbiology, Faculty of Biological Science and Technology, University of Isfahan, Isfahan, Iran.
[b]Department of Cellular Biotechnology at Cell Science research Center, Royan Institute for Biotechnology, ACECR, Isfahan, Iran.
[c]Legal Medicine research Center, Legal Medicine Organization, Tehran, Iran.
[d]Department of Surgery and Breast Cancer Research Center, Isfahan University of Medical Sciences, Isfahan, Iran.
eGoldaru Pharmaceutical Company, Isfahan, Iran.
†Corresponding author at: aDepartment of Cell and Molecular Biology and Microbiology, Faculty of Biological Science and Technology, University of Isfahan, Hezar Jerib Ave., Azadi Sq., P.O. Code 81746-73441, Isfahan, Iran. Phone no: +98-31-37932479; Fax no: +98-31-37932456 .
kamranghaedi@sci.ui.ac.ir (K. Ghaedi),
± Corresponding authors at: Department of Cellular Biotechnology, Cell Science Research Center, Royan Institute for Biotechnology, ACECR, Royan St., Salman St., P.O. Code 816513-1378, Khorsagan, Isfahan, Iran. Phone no: +98-31-95015694; Fax no: +98-31-95015687.
E-mail addresses: kamranghaedi@royaninstitute.org (K. Ghaedi), and fsforootan@royaninstitute.org (F. Seyed Forootan)

Abstract

Background: Mammospheres are breast cancer stem cells (BCSCs) that could be yielded through culturing cells in non-adherent & non-differentiating condition. With regard to therapy resistance of cancer stem cells (CSCs), it is essential to discover efficient approaches targeting CSCs. *Viola odorata* extract has been considered as a traditional herbal anti-metastatic drug in several cancer cells. Effect of this drug on BCSCs has not been clearly identified. Current study tries to detect and to compare effect of *Viola odorata* extract on malignant characterization of breast cancer cell lines and BCSCs.

Material and methods: MCF7 and SKBR3 and their derived mammospheres as BCSCs were used and the effect of alcoholic extraction of *Viola odorata* on apoptosis and malignant characters of MCF7, SKBR3 and their derived BCSCs were analyzed and compared.

Results: *Viola odorata* extract induced cell death in MCF7, SKBR3 and their derived mammospheres through apoptosis without any effects on MCF10A. Also, this extract showed anti-migratory, anti-invasion and anti-colony formation activity in MCF7, SKBR3 and their derived mammospheres which was significantly more in MCF7- and SKBR3-derived mammospheres. Also, this extract decreased size and volume of tumors generated by MCF7, SKBR3 and their derived mammospheres in chicken embryo model.

Conclusion: *Viola odorata* extract exerted anti-cancerous activity on both breast cancer cell lines and their derived BCSCs. Anti-cancerous activity of this extract was significantly more in MCF7-, SKBR3-derived mammospheres in comparison with dedicated cell lines. Data suggest that *Viola odorata* extract mostly targets cancerous cells, not normal cells with exception in high concentration. It acts in a cell dependent manner.

Keywords: Breast cancer stem cell (BCSC); Mammosphere; *Viola odorata*; Invasion; tumorigenicity

Propolis ameliorates autistic-like behaviors induced by maternal separation in rats

Ilia Ahmadi kholardi[1], Mohammadreza Bigdeli[1,2*], Akbar Hajizadeh Moghaddam[3], Sedigheh Khanjani Jolodar[1]

1 Department of Animal Sciences and Biotechnology, Faculty of Life Sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran.

2 Institute for Cognitive and Brain Science, Shahid Beheshti University, Tehran, Iran.

[3] Department of animal Biology, Faculty of Basic Sciences, University of Mazandaran, Babolsar, Iran.

Introduction

Autism is a developmental disorder specify by abnormal communication and verbal behaviors. Children with autism are unable to communicate socially and understand emotions thoughts. The stress of maternal separation in the early days of birth induces autistic behaviors.Propolis is one of the varies bee products, which is collected from plants. Propolis contains chemical compounds such as flavonoids, terpenes, and phenolic acid. Therefore, Propolis has pharmacological benefits and is a natural antioxidant. The aim of this study was to determine the effect of Propolis on autistic behaviors induced in the animal model of maternal separation in rats.

Method & material

In this experimental study, Wistar rats were divide into two groups of control and maternal separation. Rats in control groups were divide into three subgroups: control, Propolis and sham groups. The maternal separation group was divide into three subgroups: autism, Propolis (100 mg/kg) and Propolis (200 mg/kg). Rats in separation groups were separate from the mother daily for three hours in the first to ninth days after birth. Propolis were gavage to rats on day 21-42 after birth. At the end of day 42, social interaction test was take from rats.

Result

The index of social interactions in the autism group was significantly reduced compared to the control group ($P < 0.01$).In the group receiving Propolis, the social interaction index increased significantly compared to the autism group($P < 0.05$ and $P < 0.01$).

Discussion

Regular treatment with propolis for four weeks significantly improves the behavioral changes associated with rats. Therefore, it can be stated that propolis neuroprotective action for treatment of animal model of autism induced by separation from mother can be beneficial. Also, propolis can be used as a pharmacological tool due to its antioxidant activity.

Keywords: Maternal separation, autism, Propolis, social interactions

Antioxidant potential of *Chenopodium quinoa* Willd. as a promising nutraceutical

Athar Sadat Javanmard[1*], Fatemeh Khakdan[2]

[1]Department of Biology, Faculty of Science, Yasouj University, Yasuj,Iran

[2]Farzanegan Campus, Semnan University, Semnan, Iran

Corresponding author Email: a.javanmard@yu.ac.ir

Abstract

Chenopodium quinoa Willd. (a pseudocereal belongs to Amaranthaceae family) has attracted increasing attention worldwide over two last decades. It has been considered as a functional food. Besides, to be a complete nutrient, quinoa consumption could help to decrease the risk of several diseases such as diabetes, cardiovascular diseases, obesity, neurodegenerative disease, and cancers. Certain beneficial effects of quinoa extracts (seeds and leaves) are related to antioxidant activities which are raised from its phenolic compounds, vitamins, polysaccharides, and even minerals. Some studies indicated that the antioxidative power of quinoa extracts had synergistic effects with its anticancer properties. Several varieties of *Chenopodium quinoa* demonstrated different antioxidant activities which may result from distinct genotypes, environmental factors and also various antioxidant assays. In this review, we aim to focus on the antioxidant compounds of quinoa and their functional mechanisms.

Keywords: quinoa, functional food, phenolic compounds, antioxidative activity.

Evaluation of antibacterial effects of hexane extract of *Euphorbia helioscopia* root smoke

Amirarsalan Kavyanifard

Department of Biology, Payame Noor University, Tehran, 1395-4697, Iran.

Abstract

Euphorbia helioscopia is a medicinal plant that due to its large number of secondary metabolites has therapeutic effects and it root smoke has been used traditionally to treat infected wounds in west of Iran. The aim of this study was to investigate the antibacterial properties of hexane extract of *E. helioscopia* root smoke. First of all, the plant root was burned and the resulting smoke was liquefied by cooling and then extracted using hexane solvent. The extract was rotary evaporated and its antibacterial properties against a number of pathogenic bacteria was studied using disk diffusion method (100 µg/disk). Results showed that hexane fraction of *E. helioscopia* root smoke has a relatively strong inhibitory effect against all studied bacteria. This was the first attempt to study the antibacterial effects of *E. helioscopia* root smoke and confirmed the scientific correctness of traditional use of euphorbia root smoke for wound healing.

Keywords: antibacterial, *Euphorbia helioscopia*, hexane, medicinal, root smoke.

Bioinformatics study of three key enzymes of phenylpropanoids biosynthesis pathway

Mohammad Rafiei[1], Fatemeh Khakdan[2]* Athar Sadat Javanmard[3]

[1]Department of Plant Biotechnology, Isfahan University of Technology, Isfahan, Iran

[2] Farzanegan Campus, Semnan University, Semnan, Iran

[3]Department of Biology, Faculty of Science, Yasouj University, Yasouj, Iran

Corresponding author Email: khakdan.biotech@gmail.com

Abstract

Phenylpropanoids are important secondary metabolites that plants produce in the response to biotic and abiotic stimuli. We studied bioinformatic criteria of mRNA of three key enzymes (from medicinal plants (*Ocimum basilicum* and *Withania somnifera*) of phenylpropanoids biosynthesis pathway. Cinnamate 4-hydroxylase (C4H) mRNA (HM990150.1, 1518 nt), 4-coumaroyl CoA-ligase (4CL4) mRNA (KC576841, 1704 nt) and 4-Coumarate 3-hydroxylase (C3H) mRNA (HM585369.1, 1769 nt) encoded proteins consisting of 505, 576 and 511 amino acids, respectively. Three, one, and one conserved region(s) were detected in these polypeptide chains, respectively. mRNA sequences showed high homology with C4H *Ocimum tenuiflorum* mRNA (ADO16243.1, 88%), 4CL4 *Ocimum tenuiflorum* mRNA (ADO16242.1, 100%), and CYP76 hydroxylase *Withania somnifera* mRNA (AGT03776.1, 100%) respectively. Bioinformatics information about these enzymes could help to a better understanding of their functions.

Keywords: Cinnamate 4-hydroxylase, 4-coumaroyl CoA-ligase, 4-Coumarate 3-hydroxylase, phenylpropanoids

Effects of Sulforaphane in the Autistic Symptoms in Rat with by Prenatal Valproic acid induction

Sahar Heydari[1], Ali Mahmoudi[2]

1. Master student of Medical Physiology, Department of Physiology and Pharmacology, Faculty of Medicine, Sabzevar University of Medical Sciences, Iran
2. P.h.D student of medical biotechnology, Department of Medical Biotechnology and Nanotechnology, Faculty of Medicine, Mashhad University of Medical Sciences, Iran

Introduction: Autism spectrum disorder (ASD) is a wide range of disorders in the nervous system. Several prominent features are commonly observed in autistic patients; impairments in social communication, repetitive behaviors, and anxiety. Various research verified the responsibility of VPA-induced autism-like behavior. Sulforaphane, which has been reported, had positive effects on ASD.

Methods: Pregnant rats were injected intraperitoneally on embryonic day 12.5 with 500 mg/kg valproic acid to inducing an autistic rat model. Administration of male offspring using sulforaphane that injected intraperitoneally with a single dose of 12.5 mg/kg daily for 20 days. Sniffing for Social interaction, Y-maze for repetitive behavior, and elevated plus maze for anxiety was measured after the treatment period.

Results: One-way ANOVA observed a significant effect in rats that were prenatally exposed to VPA compared to control in the sniffing duration ($P < 0.05$), spontaneous alternation, and anxiety ($P < 0.0001$) significantly were changed. However, after receiving treatment with sulforaphane, the result indicated that impairment in social ($p < 0.0001$) and anxiety ($p < 0.05$) significantly improved. Spontaneous alternation as an indicator of repetitive behaviors also increased but was not significant.

Conclusion: It seems that sulforaphane could recover VPA-induced imperfection in social interaction, anxiety, and repetitive behaviors.

Keyword: Autism, Behavior test, sulforaphane, VPA

Evaluation of the leaves extract of *Rhazya stricta* as An antifungal agent by GC-Mass analysis

Maede Shahiri Tabarestani

Department of Agriculture, Payame Noor University, Tehran, Iran.

Abstract

Rhazya stricta (*R. Stricta*) Decne is one of the famous herbal plants that grow in the most desert areas in Iran, India, various regions of Pakistan and Western Asia. It has always played a major role in the treatment of human and animal diseases as a main role in the folk medicine. A large number of terpenoid indole alkaloids (TIAs) such as Eburenine and vincanine from transformed hairy root cultures of *R. stricta* were reported from crude extracts. Antibacterial activity of the non-alkaloid extract from *R. stricta* is likely to be related to the various phyto compounds, including flavonoids, terpenoids and tannins that were considered previously. The secondary metabolites such as flavonoids, phenolic and alkaloids (especially indole) compounds have been reported to have anticancerous properties. Antibacterial and antifungal activities of the fatty acids compounds have been already confirmed, too. The aim of this study was to explore the bioactive compounds in hydro alcoholic leaves extract of *R. stricta* by GC-Mass analysis. According to this research, some new alkaloids (like indole derivatives, Quebrachamine, Aspidospermidine, Vincadine, Akuammilan, Quebrachamine, Eburnamenine), several fatty acids and its derivatives, Quinoline and some natural antibiotic were detected.

Keywords: *Rhazya stricta* , Hydro alcoholic Extraction, Alkaloid, Fatty Acid, Antifungal

Sumac nanophytosome improves 6-hydroxydopamine-induced memory impairment in rat model of Parkinson's disease

Seyedeh negar setareh [1], Akbar Hajizadeh Moghaddam [1]*, Vahid hasantabar [2]

[1] Department of Biology, Faculty of Basic Sciences, University of Mazandaran, Babolsar, Iran

negar.str@gmail.com, a.hajizadeh@umz.ac.ir

[2] Department of Organic Polymer Chemistry, Faculty of Chemistry, University of Mazandaran, Babolsar, Iran. vahidhasantabar@yahoo.com

[3] Faculty of Biotechnology, Amol University of Special Modern Technologies, Amol, Iran.

Correspondence: Dr. Akbar Hajizadeh Moghaddam, Ph.D (Email: a.hajizadeh@umz.ac.ir)

Introduction:

Parkinson's disease (PD) is the second prevalent neurodegenerative disease generally characterized by the irreversible loss of dopaminergic neurons. Clinically, PD is manifested as motor symptoms and nonmotor symptoms. The nonmotor symptoms of PD include cognitive impairment.

Sumac belongs to the genus Rhus, which contains flavonoid compounds. Studies related to this plant have shown that the extracts of Sumac have antioxidant properties. Water-soluble phytoconstituents such as flavonoids in sumac are poorly absorbed, either because of their large size of molecular or due to their insignificant lipid solubility which resulted in poor bioavailability. Nanophytosomes show more bioavailability as compared to conventional herbal extracts and reaching the systemic circulation. The aim of this study was to investigate the effect of sumac and sumac nano-phytosome extracts on cognitive impairment in animal model of Parkinson's disease.

Method: The experiments were conducted using Wistar male rats (200–250 g). The rats were divided into the following groups: i) Control ii) positive control iii) 6-OHDA iv) 6-OHDA infused supplemented with 40mg/kg sumac extract (6-OHDA + SE) v) 6-OHDA infused supplemented with 40mg/kg sumac nano phytosome (6-OHDA + SNP)

Parkinson's model was made by the unilateral injection of 6-OHDA (10 µg in 2 µl/site) into the right striatum (AP: +1 mm; L: +2.5 mm; D: +4.5 mm). After 24 h of injection of 6-OHDA, the rats in the SE and SNP group were treated with sumac and sumac nano phytosome by gavage (40 mg/kg body weight) for 21 days. Also, Rats in the positive control group received the same dose of Sumac nano phytosome. Rats in the 6-OHDA group and control group were given normal saline. After last gavage, memory impairment in all groups evaluated by the novel object test.

Result: The results showed that injection of 6-hydroxydopamine decreases discrimination index ($p<0.001$) and treatment of nano-phytosomes effectively increases cognitive impairment compared with the 6-OHDA group ($p<0.001$).

Discussion: The present study was aimed to a stable sumac-loaded nano phytosome formulation to improve its antioxidant feature and bioavailability. Furthermore, in this study, the Sumac and sumac nano phytosome probably have been shown to improve cognitive impairment after 21 days in 6-hydroxydopamine-induced Parkinson's model.

Keyword: Parkinson’s disease, cognitive impairment, 6-hydroxydopamine, sumac- nano phytosome

A review of the use of the capacity of medicinal plants in controlling the complication of microbial resistance

Zahra Torinia[1], Mehdi tavakolizadeh[2], Hossein Rabbi Angourani[3]

[1].PhD Student in General Pharmacy - Zanjan University of Medical Sciences.

[2].Assistant Professor, Faculty of Pharmacy, Zanjan University of Medical Sciences

[3].Assistant Professor Research Institue of Modern Biological Techniques, University of Zanjan, Zanjan,

Abstract

Infectious diseases have always been one of the most important threats to human health and life throughout history and have constantly attracted the attention of the medical and pharmaceutical industries. On the other hand, treatment with antibiotics leads to other problems such as drug resistance, which are among today's problems. Is the world of medicine and treatment, Given that the discovery and development of new antibiotics is an expensive and time-consuming process and pharmaceutical companies must prioritize competitive projects, there is a need for other solutions to find antimicrobials.In the coming years, the high death toll from infectious diseases due to the lack of new antibiotics and the inability of old drugs due to the resistance of microbial strains will be much higher than chronic diseases such as cancer, many efforts to find alternative ways to fight bacterial infections There is no induction of resistance in the current, that the use of the capacity of native plants in the control of endemic patients has been considered by researchers.

Keywords: infection, microbial resistance, medicinal plants, Achillea.

Utilization of native capacity of some Achillea genus in controlling the complication of microbial resistance

, Zahra Torinia[1], Mehdi tavakolizadeh[2], Hossein Rabbi Angourani[3]

[1].PhD Student in General Pharmacy - Zanjan University of Medical Sciences.

[2].Assistant Professor, Faculty of Pharmacy, Zanjan University of Medical Sciences.

[3].Assistant Professor Research Institue of Modern Biological Techniques, University of Zanjan, Zanjan.

Abstract

The genus *Achillea* L. belongs to Asteraceae (Compositae), the largest family of belong to Asteraceae .they distribute widely throughout the world and most common in the arid and semi-arid regions of subtropical and lower temperate latitudes.These plants have anti-inflammatory effects and are used in the treatment of digestive problems in traditional medicineInfectious diseases have always been one of the most important threats to human health and life throughout history and have constantly attracted the attention of the medical and pharmaceutical industries. On the other hand, treatment with antibiotics leads to other problems such as drug resistance, which are among today's problems. The world of medicine is considered given that the discovery and development of new antibiotics is an expensive and time-consuming process and pharmaceutical companies must prioritize competitive projects, there is a need for other solutions to find antimicrobials. In the coming years, the high death toll from infectious diseases due to the lack of new antibiotics and the inability of old drugs due to the resistance of microbial strains will be much higher than chronic diseases such as cancer. There is no induction of resistance in the current, that the use of the capacity of native plants in the control of endemic patients has been considered by researchers. Field studies showed that in Zanjan province, due to the large habitats of four species of yarrow, including *A. tenuifolia* lam , *Achillea milleolium L*, *Achillea wilhelmsi* c.koch, *Achillea vermicularis*, it is possible to exploit and use and research to process the essential oils of the species. These are found in antibiotic products.

Keywords: *Achillea*, Asteraceae, Microbial Resistance, Medicinal Plants, Endemic**.**

Shahspran: A Forgotten Medicinal Plant in Foods

Lida Ebadi[1*], Ali Ganjloo[2], Mandana Bimakr[2]

[1]M.Sc. Student of Food Technology, Department of Food Science and Engineering, Faculty of Agriculture, University of Zanjan, Zanjan 45371-38791, Iran

[2]Associate Professor, Department of Food Science and Engineering, Faculty of Agriculture, University of Zanjan, Zanjan 45371-38791, Iran

[*]Corresponding author: lida.ebadi1996@gmail.com

Abstract

Tanacetum balsamita is medicinal plant belongs to the copmosiate family which locally called Shahsparan. Shahsparan is distributed in East Azerbaijan and widely used as a pain killer, cardiac tonic and tranquilizer in Iranian traditional medicine systems. Shahsparan possess high content of yellowish essential oil which carvone, α-thujone and camphor are the main bioactive compounds. These compounds can cause unique biological properties such as antioxidant, antimicrobial, analgesic and anti-inflammatory activities. Due to its beneficial effects, shahspran has potential for more cultivation and more usage in food and pharmaceutical industries. Unfortunately, its importance considerably diminished. In this mini review, the chemical composition of its essential oil as well as its biological activities was introduced. In addition, the extraction process of its essential oil for potential application in food industry was also discussed.

Keywords: Essential oil, *Tanacetum Balsamita* L., Shahsparan, Bioactive compounds.

Comparative study of total phenolic content and antioxidant activity of *Nepeta pogonsperma* hexane and hydroalcoholic extracts

Behvar Asghari, Sudabeh Mafakheri

Department of Horticultural Sciences Engineering, Faculty of Agriculture and Natural Resources, Imam Khomeini International University, Qazvin, Iran

Abstract

The genus Nepeta (Lamiaceae) comprises 280 species that are distributed over a large part of central and southern Europe, and west, central, and southern Asia. About half of the existing species are recorded in Iran [1]. Nepeta species are widely used in folk medicine because of their antispasmodic, diuretic, antiseptic, antitussive, antiasthmatic, and febrifuge activities. The feline attractant properties of several Nepeta species have been known for a long time [2]. This study was designed to examine the total phenolic content and *in vitro* antioxidant activity of the various extracts of *Nepeta pogonsperma* including hexane and hydroalcoholic extracts. The amounts of total phenolics solvent extracts for the aerial parts of plant were determined spectrometrically. According to the obtained results hydroalcoholic extract of the plant showed higher phenolic content with 189.7 mg Gallic acid equivalents per gram extract, while the hexane extract was found to contain lower amounts of phenolic compounds (59.5 mg GAEs/g extract). Antioxidant activities and phytochemical compositions of the extracts were found to be in correlation with each other. The higher phenolic compounds containing hydroalcoholic extracts also possess higher antioxidant activity. Phosphomolybdenum assay were used for measuring the antioxidant activities of the extracts. Total antioxidant activities of *N. pogonsperma* hydroalcoholic and hexane extracts were found to be 76.8 and 41.4 mg AAEs/g extract, respectively. The prepared extracts of the plant were also analyzed for their radical scavenging activities on DPPH radicals.

Keywords: Extract, Medicinal plants, Nepeta

Protective effect of Vitex agnus-castus on memory deficits induced by repeated exposure toluene in mice

Soroush Farhadi Pahndari[1], Akbar Hajizadeh Moghaddam[1], Fereshteh mirmohammadrezaei[1]
1.Department of Biology, Faculty of Basic Sciences, University of Mazandaran, Babolsar, Iran

Abstract

Toluene is an organic solvent widely used in many industrial processes. long-term toluene abuse has been associated with cognitive impairment, memory deficits, difficulty to concentrate and decreased IQ. toluene induces an oxidative imbalance in the hippocampus and prefrontal cortex.

Vitex agnus-castus is a source of phytoestrogens, flavonoids and apigenins. Phytoestrogens from V. agnus-castus affected on anxiety behaviors. The aim of this study was to determine the effect of V. agnus-castus on Toluene-induced behavior disorders in mice.

Method & material: In this experimental study, 50 mice were collected and divided into 5 groups: control, sham, extract, toluene, and toluene with the extract. Then we injected toluene and the extract intraperitoneally to the mice for 14 days. At the end, the mice were tested for Novel object test.

Result: The Discrimination index of toluene group had a significant decrease compared to the control group ($p<0.01$) and the Discrimination index in toluene with extract group had a significant increase compared to the toluene group ($p<0.001$).

Discussion: Regular treatment with Vitex agnus-castus for two weeks remarkably improved memory defects. Therefore, can be expressed that V. agnus-castus neuroprotective action for treatment can be useful in medicine.

Keyword: Toluene, Vitex agnus-castus, mice, memory defects.

Evaluation of *Nostoc commune* extract effects on locomotor activity 6-OHDA-induced in model of Parkinson's disease

Ghazaleh Javaherdoust[1], Akbar Hajizadeh Moghaddam [2*], Ehsan nazifi[3]

Department of Animal Sciences, Faculty of Basic Sciences, University of Mazandaran, Babolsar, Iran

Department of Plant Sciences, Faculty of Basic Sciences, University of Mazandaran, Babolsar, Iran

*Corresponding Author's E-mail: jv.ghazal92@gmail.com

Introduction

Emerging evidence continues to demonstrate that increased oxidative stress in the pathology of Parkinson's disease (PD) Causes irreversible loss of dopaminergic neurons. PD is held responsible for the characteristic motor signs and symptoms (such as tremor, postural instability, bradykinesia, hypokinesia, rigidity). Cyanobacterium ***Nostoc commune*** (NC) has been traditionally used as a healthy food and medicine for centuries, especially that exhibit strong antimicrobial and antioxidant activities. The present study aims to evaluate the effects of the NC extract on motor dysfunction 6-OHDA-induced in animal model of Parkinson's disease.

Method & material

In this experimental study, 40 Wistar male rats (200–250 g) were divide the following groups: i) control, ii) 6-OHDA-lesioned, iii) 6-OHDA infused supplemented with 50 mg/kg NC extract (6-OHDA+NC 50), and iv) 6-OHDA infused supplemented with 100 mg/kg NC extract (6-OHDA+NC 100). The Parkinson's model was induced by 6-OHDA (10 µg in 2 µl/site) injection unilaterally (AP: +1 mm; L: +2.5 mm; D: +4.5 mm). After 24 h, intrastriatal 6-OHDA-lesioned rats received the NC extract (50 and 100 mg/kg) orally for three weeks. The open field test (OFT) on day 21 was carried out.

Result

The results showed that injection of the 6-OHDA-lesioned group decreased locomotor activity in the OFT ($p < 0.001$) compared to control group. NC 50 and NC 100 treatment increased the locomotor activity into the OFT ($p < 0.001$) compared with the lesioned group. Besides, NCE 100 showed better therapeutic effects than NCE 50.

Discussion

In conclusion, Regular treatment with NC extract in rats for three weeks significantly decreased the locomotor activities. Therefore, it can be stated that neuroprotective action in improvement of motor dysfunction may be attributed to antioxidant activities. Thus, using these substances may be useful by modulating the level of antioxidant activity and protecting the nervous system against 6-OHDA toxicity as a pharmacological tool.

Keywords: Nostoc commune, locomotor activity, Parkinson's disease, 6-hydroxydopamine

Evaluation of the possible inhibitory effect of *Ganoderma lucidum* on clinical strains of *Helicobacter pylori*

Tahereh Agha Motallebi Khobani [1], Bahareh Attaran [1], Mohammad Reza Soudi [1], Tayebeh Fooladi[1]

Microbiology Department, Faculty of biological sciences, Alzahra University, Tehran, Iran

Abstract

Ganoderma sp. is a medicinal mushroom producing biologically active substances such as sterols, proteins, polysaccharides, and triterpenoids. *Helicobacter pylori* strains have become increasingly resistant to antibiotics in recent years. In this article, the effect of *Ganoderma* fungal extract to inhibit these bacteria has been evaluated. In this study, inhibition zone and minimum inhibitory concentration (MIC) values of extracts prepared from the fruiting bodies of *Ganoderma lucidum* were determined against *H. pylori* using seven clinical isolates via an in vitro disc diffusion and agar dilution assay according to the CLSI standard. Amoxicillin was used as control. The crude Methanolic extracts of *G. lucidum* (10 mg/ml) inhibited the growth of *H. pylori* in vitro, with the inhibition zone diameter 24 to 40 mm. The inhibition of *H. pylori* was observed through an agar dilution test with minimal inhibition concentration (MIC) values from 850 µg/mL to 1000 µg/mL. This finding indicates that the compounds in *Ganoderma* species are active against *Helicobacter pylori* in vitro. Due to humans' growing reluctancy from synthetic drugs and tendency toward natural bioactive remedies, fungi can be a suitable source to meet this need. However, in vivo assessment should be done.

Keywords: *Ganoderma lucidum*, *Helicobacter pylori*, Antimicrobial properties, Antibiotic resistance

Hypolipidemic Effect of Some Traditional Herbs of Kermanshah Province

Maryamsadat Moshasshaei - Somayeh Bohlouli

1.Department of Biology, College of Basic Science, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran.
2.Department of veterinary medicine ,College of Agriculture, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran.
*Corresponding author: **SomayehBohlouli**
Department of veterinary medicine , College of Agriculture, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran
E-mail:sbohloli@yahoo.com tell:09113232385

Abstract

Hyperlipidemia is one of the metabolic disorders caused by various factors. Although hyperlipidemic drugs are available, this disease is considered one of the factors involved in the intensification of cardiovascular diseases in patients with diabetes, hypertension, and cardiovascular diseases. Factors such as patient dissatisfaction with hyperlipidemic drugs, the incidence of the side effects caused by excessive and prolonged use of these drugs, diseases caused by hyperlipidemia, and costs imposed on the patients have increased the desire for the use of alternative and traditional therapies. Epidemiologic observations have shown that a good diet, use of alternative therapies, consumption of herbs and vegetables, in addition to reducing the treatment costs, have satisfactory effects on the complications of hyperlipidemia in many communities. It should be noted that the tendency to consume medicinal plants that reduce blood lipid is very common even in developed countries. However, the arbitrary use of medicinal plants with unknown dosage causes adverse effects such as pharmaceutical and toxic interactions in patients. Yet, the use of traditional medicine and native plants along with chemical and synthetic drugs is still significantly increasing. Some native plants and their compounds affect the metabolism of lipids and reduce lipid factors such as cholesterol and triglyceride. With a good diet and consumption of medicinal plants by patients with hyperlipidemia, the effect of these plants and the reducing trend of blood lipid factors in these patients are suggested to be examined by physicians

Keywords: herbal medicine, Kermanshah, lipid, cholesterol, triglyceride

Increasing the caspase 3/7 activity in MDA-MB-231 breast cancer cell line by the methanolic extract of Prangos crossoptera

Zahra Derakhshan Horeh - Maryam Moori

Abstract

Breast cancer is regarded as a multifactorial disease that leads to many deaths among women. Detrimental side effects, drug resistance, and a high rate of mortality have prompted the need to discover novel, safe, and effective drugs. Medicinal plants as an enormous source of native components are one of the main candidates for discovering new anticancer drugs. Prangos genus is one of the important medicinal plants with valuable therapeutic virtues and anticancer properties of several Prangos species have been reported. This study aimed to evaluate the anticancer properties of the methanolic extract of Prangos crossoptera in the MDA-MB-231 cell line.

In the current study, MDA-MB-231 (human breast adenocarcinoma) and HDF (Human Dermal Fibroblasts) cell lines were treated with different concentrations of methanolic extracts of Prangos crossoptera (0, 50, 150, 250, 350, and 450 µg/mL) for 24, 48, and 72 h. Cytotoxicity effects of the samples on the MDA-MB-231 and HDF cells were examined using [3-(4, 5-dimethylthiazolyl)-2, 5-diphenyl-tetrazolium bromide (MTT) method. Also, caspase 3/7 activity was measured using caspase 3/7 colorimetric assay kit to investigate the effects of the extracts on the programed cell death pathway in the treated cells.

The results of the current study revealed that growth of MDA-MB-231 cells significantly inhibited after 48 and 72h of treatment with extract compared to the control group ($p < 0.05$). Furthermore, measurement of caspase 3/7 activity showed that methanolic extract of Prangos crossoptera significantly increased the caspase 3/7 activity in treated cells compared to the control group.

Prangos crossoptera seems to affect the programed cell death pathway by increasing the caspase 3/7 activity in MDA-MB-231 cell line.

Keywords: MDA-MB-231, Medicinal plants, Prangos crossoptera, Caspase 3/7

Effect of some traditional herbs in Kermanshah province on blood glucose reduction

Yasna Bidmeshki -somayeh Bohlouli

1.Department of Biology, College of Basic Science, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran.
2. Department of veterinary medicine ,College of Agriculture, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran.

*Corresponding author: **SomayehBohlouli**

Department of veterinary medicine , College of Agriculture, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran
tell:09113232385 sbohloli@yahoo.com:E-mail

Abstract

iabetes is one of the chronic and complex diseases of current societies that increases blood glucose and metabolic disorders due to insulin shortage or deficiency. Epidemiologic observations have shown that the prevalence of diabetes has increased with a change in the diet and lifestyle from traditional to industrial. Hence, knowledge of food therapies and herbs is highly important for the improvement of diabetic patients and blood glucose control. Before the discovery of insulin as well as common antidiabetic drugs, diabetic patients were treated with herbs and traditional therapies. So far, the positive effects of more than 1,200 herbs have been known to reduce blood sugar levels or reduce its side effects. Medicinal plants have long been used to control blood sugar, reduce complications, and increase the life quality and longevity of diabetic patients. Due to the many side effects of chemical drugs used for the treatment of diabetes and gastrointestinal diseases, it is necessary to research drugs with minimal side effects and a high degree of reliability. Moreover, most medicinal herbs have limited habitats, which has put them at the risk of extinction due to the destruction of habitats by human activities. Therefore, collecting information about medicinal plants and their application from different places, which has been passed down from one generation to the next, is a valuable source of ancient medicine in the present time. This review was aimed to investigate the effect of some native plants in Kermanshah province on blood glucose reduction.

Keywords: Diabetes, glucose, Traditional herbs, Kermanshah province, Hypoglycemic

Effect of Vitex agnus-castus extract on progesterone levels in the presence of toluene in female mice

Fatemeh Malekzadeh Estalkhi[1], Fereshteh mirmohammadrezaei [1], Akbar Hajizadeh Moghaddam[1]

1.Department of Biology, Faculty of Basic Sciences, University of Mazandaran, Babolsar, Iran

Abstract

Introduction: Toluene or methylbenzene is an organic solvent widely used in many industrial activities. Toluene can suppress the function of ovary and alter the levels of progesterone hormone. Vitex agnus-castus belongs to the family Verbenaceae. The fruit has been recommended as a hormone-like and antioxidant remedy for alleviating menstrual disorders, sedative, relieving menstrual pain and for treating digestive disorders. In this study we investigate the protective effect of vitex extract in presence of toluene on ovarian function.

Method & material: Fifty adult mice were divided into 4 groups: sham group received saline and corn oil, toluene group received 100 mg/kg toluene, vitex group received the extract of vitex at a dose of 100 mg/kg and a group received 100 mg/kg toluene in presence of 100 mg/kg dose of vitex extract. treatment were done intraperitoneally for 14 days. after 14 days mice were sacrificed and Blood samples were collected for hormonal analysis.

Discussion: Our findings indicated treatment with Vitex extract for two weeks can protect ovary against toluene toxicity and improve the function of ovary in mice.

Result: Our results showed toluene administration significantly decreased progesterone level compared to sham group ($p<0.05$). Vitex extract significantly increased the level of progesterone comparison in sham group ($p<0.05$). Also, treatment with vitex extract in presence of toluene significantly increased progesterone hormone compared to toluene group ($p<0.01$).

Keyword: Toluene, Vitex agnus-castus, mice, ovary, progesterone.

Effects of different con concentrations of *Ziziphus Jujube* L. (Rosales: Ramnaceae) on Inhibition of breast cancer cell proliferation (MCF-7)

Leila Soltani[1] and Maryam Darbemamieh[2]

1. Department of Animal Sciences, Faculty of Agriculture and engineering, Razi University, Kermanshah, Iran.

2. Department of Plant Protection, Faculty of Agriculture, Razi University, Kermanshah, Iran.

*Corresponding Author: Maryam Darbemamieh Email: m.darbemamieh@razi.ac.ir; Tel: (+98)9133299132)

Abstract

Ziziphus Jujube L. (Rosales: Ramnaceae) is a fruit tree that grows with different characteristics and flavors in some tropical and subtropical regions of the world. This fruit has been used as food and medicine. Phytochemical studies on *Z. jujube* have led to the extraction and identification of various alkaloids, flavonoids, tannins, sterols and saponin. The aim of this study was to evaluate the anti-proliferative properties of *Z. Jujube* aqueous extract in low concentrations on breast cancer cells (Mcf-7). After preparation of *Z. Jujube* fruit, its kernels were separated and the fruit was dried. The concentrations of 30, 60, 120 and 240 µg/ml from this extract were added to the cell culture medium. The non-treated group was considered as a control. Anti-proliferative properties were evaluated by MTT assay. Data were analyzed in SPSS software and a significance level of 5% was considered. Addition of 240 µg/ml aqueous extract to the culture medium of cancer cells had the greatest toxicity effect compared to other concentrations of aqueous extract ($p<0.05$). In this study, the anti-proliferative effects of different concentrations were dose-dependent. Finally, it seems that *Z. Jujube* aqueous extract has relative anti-proliferative effects at high concentrations, which used in this essay.

Keywords: Aqueous extract, Anti-cancer, Cytotoxicity, Jujube, Apoptosis

Essential oil analysis of three Stachys species from Qazvin

Sudabeh Mafakheri [1], Roghayeh Aminian[2]

[1]Department of Horticultural Sciences Engineering, Faculty of Agriculture and Natural Resources, Imam Khomeini International University, Qazvin, Iran

[2]Department of Genetic and plant breeding, Faculty of Agriculture and Natural Resources, Imam Khomeini International University, Qazvin, Iran

Abstract

The genus Stachys (family Lamiaceae) is distributed in the Mediterranean regions and south-west Asia. About 300 Stachys species are reported; 34 of these are found in Iran, of which 13 are endemic. Several Stachys species are used in Iranian folk medicine as medicinal plants. The volatile composition of three Stachys species has been studied. The investigated taxa were *St. inflata*, *St. lavandulifolia* and *St. schtschegleevii*, growing wild in Qazvin. The essential oils were obtained by hydro-distillation in a modified Clevenger-type apparatus, and their analyses were performed by GC and GC–MS. Sesquiterpene hydrocarbons were shown to be the main group of constituents of all taxa. The main components in *St. lavandulifolia* essential oil, were germacrene-D (14.1%), β-phellandrene (13.4%), α-pinene (9.2%), myrcene (8.4%), β-pinene (6.9%) and ocimene (6.8%). the major components of *Stachys inflata* were spathulenol (20.55%), α-terpineol (9.45%), linalool (7.37%), and α-pinene (6.8%). In *St. schtschegleevii* species, α-pinene (20.5%), β-phellandrene (12.6%), germacrene D (12.9%), β-pinene (10.5%) and α-phellandrene (3.7%) were the major components of essential oil.

Keywords: Lamiaceae, Stachys, Volatile constituents

Ethno-botanical Survey of Traditional Medicinal Plants of Abhar County, Iran

Mahtab Moghaddam,[1] Farzaneh Khajoei Nasab[1] , Ahmadreza Mehrabian[*1]

[1]Department of Plant Sciences and Biotechnology, Faculty of Life Sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran.

[*]E-mail: a_mehrabian@sbu.ac.ir

Abstract

Plants are a key component of traditional medicine that has long been used by humans since ancient times. Despite the dramatic advances in the health care system and pharmaceutical industry, still traditional herbal medicine is used all over the World. According to World Health Organization [1] approximately 80% of the world's population use traditional herbal medicines for primary healthcare and approximately 85 % primary health remedies are obtained from plants [2]. Indigenous knowledge and ethnobotany have played a remarkable role in the development of new medications in many centuries. The present study was carried out with an aim to gather, evaluate and document the indigenous knowledge of therapeutic uses of medicinal plants by the local people of Abhar in Zanjan province. Ethnobotanical information was gathered by semi-structured interviews during 2018-2019. The data obtained were quantitatively analyzed by RFC, CI and F_{IC} indices. A total 70 medicinal plants belonging to 32 families were documented. Asteraceae was the predominant family over others with 11 reported medicinal plant species, leaf was the most used part, and herbal tea the most preferred preparation type. *Anthemis cotula* L. and *Rosa canina* L. have the largest value of relative frequency of citation and cultural importance indices respectively. The current study indicated the importance to document traditional knowledge of some medicinal plants in Abhar. However, further clinical and experimental studies are needed to ensure the efficacy and safety of these medicinal plants.

Keywords: Ethnobotany; Herbal medicine; Asteraceae; Use value; Zanjan

Effect of heat stress on growth and productivity of salvia officinalis grown at Meshgin-Shahr, Ardabil

Mehdi Joudi

Associate professor, Meshgin-Shahr Faculty of Agriculture, University of Mohaghegh Ardabili

Email: mehdijoudi@gmail.com

Abstract

Salvia is a perennial woody shrub native to the Mediterranean area, and its leaves are used as raw materials in medicine, perfume, and the food industry. Heat stress and high temperate occur frequently during the growth and development of spring-cultivated plants. Studying the growth, productivity, and morphological traits of these plants under heat stress is necessary to optimize their cropping techniques. The experiment was performed at research farm of Meshgin-Shahr Faculty of Agriculture, University of Mohaghegh Ardabili during 2019 growing season. Seedling of the salvia officinalis was performed at early of May (optimum seedling date) and early of June (late seedling date) whereas plant growth and development takes place under heat stress condition. Plant height, main stem branch number, leaf length, leaf width, stem diameter, main stem internode number and plant fresh weight were measured at the end of the season (at late of September). The results showed that there were no significant differences between optimum and late seedling in terms of measured traits except for stem diameter. Heat stress imposed in late seedling conditions decreased stem diameter by 17 percent. These results show that salvia officinalis can adapt to heat stress conditions and sustains its growth and productivity.

Keywords: salvia officinalis, heat stress, morphological traits.

Encapsulation of essential oils for enhancement antifungal activity

Maede Shahiri Tabarestani

Department of Agriculture, Payame Noor University, Tehran, Iran.

Abstract

Medicinal plants are known as important sources of the bioactive compounds. The prepared essential oils from medicinal plants are aromatic, volatile oily liquids consist of various terpenes, phenols and other minor compounds. They have broad antimicrobial and insecticidal activities. The main problem in using essential oils is their volatility, instability and vulnerable nature. During application, essential oils can be normally decomposed by oxidation, volatilization, heating, light, etc. Degradation of the bioactive compounds decreases efficacy of essential oils. Encapsulation is introduced as a suitable and novel approach to overcome the above limitations. In this technique, the small particles of core material were enclosed by a shell material to protect them from unfavorable environmental conditions. Hence, this method will decrease the evaporation rate and facilitate handling. The produced particles will have uniform distribution with controlled release of the bioactive compounds. Efficiency of the encapsulation can be related to the kind of selected encapsulation technique, so should be considered. There are a lot of researches that demonstrated antifungal properties of the essential oils were enhanced *via* encapsulation.

Keywords: Antifungal, Encapsulation, Enhancement, Essential oils

The effect of biostimulants in reducing the adverse effects of drought stress in *Cuminum cyminum* L.

Roghayeh Aminian Dehkordi

Faculty of agriculture and plant resources, Dep. for genetics and plant breeding, Imam Khomeini International University, Qazvin, Iran

Abstract

In order to investigate the effect of biostimulants on agronomic traits of cummin under different irrigation conditions, a two-factor experiment was conducted in a randomized complete block design in the greenhouse of Imam Khomeini International University. Experimental factors included 1- Irrigation at two levels of 100% field capacity and 50% field capacity; 2. Biostimulants at four levels included non-application of biostimulants (control), application of mycorrhizal fungi, application of seaweed, combined application of mycorrhizal fungi and seaweed. The studied traits included grain yield, yield components and essential oil percentage. The results of analysis of variance showed that the effect of irrigation and biostimulants on all studied traits was significant. The interaction effect of irrigation × biostimulant was significant for most traits except height, number of seeds per umbel, 1000-seed weight and essential oil. The highest amount of traits was observed in the treatment of simultaneous application of seaweed and mycorrhizal fungi in conditions of 100% of field capacity and the lowest amount of traits in conditions of irrigation with 50% of field capacity and no application of biostimulant. Application of mycorrhizal fungi and seaweed alone and in combination reduced the adverse effects of drought stress, but the greatest effect of these biostimulants was observed in their combined application.

Keywords: Grain yield, Mycorrhiza fungi, Seaweed.

Investigations of the relationship between *Cuminum cyminum* L. traits under normal irrigation and drought stress

Roghayeh Aminian Dehkordi

Faculty of agriculture and plant resources, Dep. for genetics and plant breeding, Imam Khomeini International University, Qazvin, Iran

Abstract

In order to investigate the relationship between different agronomic traits of cummin plant, an experiment was done in the form of a randomized complete block design under normal irrigation (irrigation at 100% of field capacity) and drought stress (irrigation at 50% of field capacity) in the greenhouse of Imam Khomeini International University. The studied traits included plant height, number of sub-branches, number of umbrellas per plant, number of umbrellas per umbel, number of seeds per umbel, 1000-seed weight, biological yield, grain yield, harvest index and essential oil percentage. The results of correlation analysis showed that in both normal irrigation and drought stress conditions, grain yield was positively correlated with height, number of branches, number of umbrellas per plant, number of umbrellas per umbel, number of seeds per umbrella, 1000-seed weight, biological yield, harvest index and essential oil percentage. Under normal irrigation conditions, the highest correlation between grain yield (0.95) was observed with the number of sub-branches, number of umbrellas per plant and essential oil percentage. Under drought stress, grain yield had the highest correlation with the number of umbrellas per plant. The highest correlation between essential oil percentage and number of umbrellas per plant (0.98) and number of seeds per umbrella (0.93) was observed under normal irrigation and drought stress conditions, respectively. The results of stepwise regression showed that under normal irrigation conditions the number of branches and 1000-seed weight had the greatest effect on grain yield and justified 96% of the changes, while under stress conditions the number of umbrellas per plant and the percentage of essential oil had the greatest effect on grain yield and explained 95.8% of the changes. Under normal irrigation conditions, the number of umbrellas per plant and under stress conditions, the number of seeds per umbrella had the greatest effect on the percentage of essential oil and explained 95.6% and 85.7% of the changes, respectively.

Keywords: Essential oil percentage, Correlation, Stepwise regression, Yield.

Antioxidant effects of hydro-alcoholic extracts from *Echinacea purpurea* and *Silybum marianum*

Nahid Moarrefzadeh and Maryam Darbemamieh

Department of Plant Protection, Faculty of Agriculture and Natural Resources, Razi University, Kermanshah, Iran.

E-mail: n.moarrefzadeh@razi.ac.ir; m.darbemamieh@razi.ac.ir

Abstract:

Nowadays, special attention is dedicated to the protective effects of antioxidants from natural origins. The use of herbs and their extracts to treat a wide range of diseases is rapidly evolving. Some medicinal plants contain high amounts of antioxidants that can be effective in human health. *Echinacea purpurea* (Asteraceae family) which is cultivated in most parts of Europe and Asia as well as Iran, has been traditionally used to treat snakebite, gum and mouth diseases, colds, coughs and sore throats. In the last decades, this plant has become famous worldwide for its antiviral, antifungal and antibacterial properties. *Silybum marianum* is an annual or biennial plant of the Compositae family. This plant grows in different parts of the world as well as in the northern, western and southern parts of Iran. The seeds of this plant contain phallonolignan compounds called silymarin, which is used as an antioxidant in the treatment of various liver diseases. The aim of this research was to evaluate and compare the antioxidant properties of *E. purpurea* and *S. marianum*. The hydro-alcoholic extracts of *E. purpurea* and *S. marianum* were prepared and their antioxidant properties were measured by DPPH free radical scavenging. *E. purpurea* at a concentration of 4 mg/ml had the highest antioxidant effect (45% reduction of DPPH solution) which was significantly higher than the the reduction by the same concentration of *S. marianum* (25%). It seems that *E. purpurea* has better regenerative effects compared to *S. marianum*. New data about antioxidant effects of herbal extracts can promote the usage of various natural antioxidant products.

Keywords: Herbal extracts, Natural antioxidants, Milk thistle, Purple coneflower

Identification of specific flavonoids and their diversity in four subspecies of *Teucrium orientale* from Iran

Seyed Hossein Bagheri Moghadam [1], Navaz Kharazian [1*]

[1] Department of Botany, Faculty of Sciences, Shahrekord University, Shahrekord, Iran

[*]Email:nkharazian@gmail.com

Abstract

Teucrium orientale L. belonging to the genus *Teucrium* L., Lamiaceae family is widely distributed in Asia and North America. It has different medicinal properties and a great source of metabolites. This study aimed to recognize specific flavonoid markers and their diversity in subspecies of *T. orientale*. A total of 26 accessions of four subspecies (subsp. *orientale*, *taylori* (Boiss.) Rech.f., *glabrescens* (Hausskn. ex Bornm.) Rech. f., and *gloeotrichum* Rech. f.) were collected from southwest, south and center of Iran. The flavonoid was extracted from air-dried leaves (15gr, 90% CH3OH) and concentrated using a rotary evaporator at 40°C. Flavonoid isolation and purification were performed by thin layer chromatography, column chromatography and $CHCl_3$-CH3OH-H2O (50:40:10). Subsequently, 12 methanol fractions were analyzed using HPLC-MQ-API-MS/MS. In order to investigate flavonoid diversity, principle component analysis (PCA) was applied using PAST 4.03. According to our findings, 26 flavonoid compounds were recognized as subspecies indicators including diglucoside, rhamnoside, arabinoside, manoyl-glucoside, and glucosyl acetate substitutions. PCA analysis also showed that the highest flavonoid diversity was observed in subsp. *orientale* (13 compounds) and the lowest was found in subsp. *taylori* (five compounds). Compared with south regions, center and south-west of Iran strongly influenced sub-specific levels of *T. orientale*. Consequently, these findings are mainly used in industrial productions, chemotaxonomic and pharmaceutical purposes.

Keywords: flavonoid, mass spectrometry, medicinal, *Teucrium*

Evaluation of antioxidant effect and antimicrobial activities of various extract of *Rhus coriaria L.*

Samaneh Heydari[1], Abdolrasoul H. Ebrahimabadi*[2], Azam Monfared[3], Sayed Ahmad MirshoKraei[4], Zahra Zahra Dashtizadeh[5]

1.PhD student., Department of chemistry, University of Mohaghegh Ardabili, Ardabil. Iran

2. Associate Professor, Essential Oil Research Institute, University of Kashan, Kashan. Iran

3. Associate Professor, Department of chemistry, Payame Noor University, Tehran. Iran

4. Professor, Department of chemistry, Payame Noor University, Tehran. Iran

5. Master of Science, Department of chemistry, Payame Noor University, Mashhad. Iran

Abstract

In this study the Antioxidants with natural origin attracted a considerable attention. In the present work methanolic extract fractions of each parts (leaf, leafstalk, stem, green fruit, ripe fruit and seed) of the plant were subjected to a screening for their possible antioxidant capacity by using 2,2-diphenyl-1-picrylhydrazyl (DPPH) and β-carotene-linoleic acid assays. Also, total phenolic constituents of extracts were examined by Folin ciocalteu reagent. Of all samples, leaf extract of Rhus coriaria L. showed the high ability to reduce DPPH and β-carotene oxidation inhibition but seed extract of the plant showed the high amount of phenolic compound equivalent with Gallic acid. (IC50 = 7.82 ± 0.17 against IC50=19.05±0.80 for BHT as blank in DPPH test, Inhibition percent=82.02% against Inhibition percent=89.47% for BHT as blank for β-carotene-linoleic acid assay and 331.53±32.28µg/ml in total phenolic constituents of extracts).

Keywords:*Rhus coriaria L.*, Anacardiaceous, Leaf, Stem, Leafstalk, Antioxidant activity, methanolic extract, 2,2-diphenyl-1-picrylhydrazyl (DPPH), Gallic acid, Folin ciocalteu

Electrochemical study of blackberry berries, leaves and roots related to Tarom region of Zanjan-Iran

seyed mohammad shoaei

Department Of Chemistry, Zanjan Branch, Islamic Azad University, Zanjan , Iran
*E-mail: s_mohammadshoaei@yahoo.com

Abstract

Oxidation is one of the most important chemical processes in food and chemicals. Free radicals can oxidize nucleic acids, proteins and lipids, initiating degenerative diseases [1-3]. Cyclic voltammetry is a unique technique for the electrochemical characterization of compounds by providing data about their oxidation/reduction potentials. Beside simplicity and rapidness, this technique is based on the chemico-physical properties of the molecules and can be widely used in evaluating antioxidant in oil and food stuff [4]. The literature review shows that there is a good correlation between the oxidation potentials of various antioxidant and their antioxidant effiEnglish – detected. It is clear that the data obtained by different assays reflect only the specific antioxidant capacity in the corresponding system. But it should be noted that antioxidant capacity is not dependent on one simple specific reaction and different mechanisms could be involved in antioxidant activity. In order to evaluate the overall antioxidant capability present in food and medicinal plants, electrochemical approaches without use of a certain reactive species could be applied [5]. Different screening methods have been reported for the evaluation of antioxidant properties of plant extracts in the literature. In the present research a rapid screening method has been introduced based on cyclic voltammetry for antioxidant screening of some selected medicinal plant extracts. Cyclic Voltammetry of methanolic extracts of : blackberry berries, leaves and roots related was carried out at different scan rates. Based on the interpretation of voltammograms, blackberry berries contained the highest amount of antioxidants. Cyclic voltammetry is expected to be a simple method for screening antioxidants and estimating the antioxidant activity of foods and medicinal plants.

Kewords: Cyclic voltammetry, Antioxidant, Plant extracts, Electrochemical

Study of electrochemical behavior of orchis plant by cyclic voltammetry and squar wave

Seyed mohammad shoaei* and Vahid valizadeh

Department Of Chemistry, Zanjan Branch, Islamic Azad University, Zanjan , Iran
*E-mail: s_mohammadshoaei@yahoo.com

Abstract:

Orchis is a genus in the orchid family, occurring mainly in Europe and Northwest Africa, and ranging as far as Tibet, Mongolia, and Xinjiang. The name is from the Ancient Greek ὄρχις orchis, meaning "testicle", from the appearance of the paired subterranean tuberoids. In recent years, more attention has been devoted to herbal medicines. Up to now, many compounds with therapeutic effects has been extracted from the herbs[1-5]. The aim of this study is to evaluate the antioxidant and the antimicrobial effect of Orchis. Also We have investigated atioxidan capacity Orchis using with cyclic voltammetry and squar wave voltammetry methods. Effect of pH and some metal on the antioxidant capacity has been studied (Fe^{3+},Ca^{2+},Cd^{2+},$Co^{2+}$and Cr^{3+}).The kinetic data were extracted from cyclic voltammograms with the help of digital simulation. The homogeneous and heterogeneous rate constants were estimated by comparing the experimental cyclic voltammetric responses with the digital simulated results. We have investigated atioxidan capacity Orchis using with cyclic voltammetry and squar wave voltammetry methods. The kinetic data were extracted from cyclic voltammograms with the help of digital simulation. The homogeneous and heterogeneous rate constants were estimated by comparing the experimental cyclic voltammetric responses with the digital simulated results. The reduction of Orchis is pH independent and occurs at very high potentials, which means that it can be studied only at pH values higher than 5. The use of buffer electrolyte in a mixed acetonitrile/water solvent proved very convenient for preventing strong adsorption of the analyte on the electrode surface and enabling better repro- ducibility and sensitivity. Adsorptive linear sweep square wave voltammetry permitted accurate quantification of Orchis in commonly used pharmaceutical drugs in the micromolar range after a very simple and rapid sample treatment. Good precision was obtained .This electroanalytical method can be used for determination of thera- peutic doses of Orchis in biological fluids if coupled with high performance liquid chromatog- raphy (HPLC) with electrochemical detection.

Keywords: Antioxidant, Electrochemical, Cyclic Voltammetry, squar wave voltammetry

Ethnobotany and effect of natural habitats on characteristics of Iranian Ox-Tongue (*Echium amoenum* Fisch & Mey.)

M.B. amiri[1*], P. Rezvani Moghaddam[2] and M. Jahan[3]

1*- Assistant Professor, Faculty of Agriculture, University of Gonabad, Iran

E-mail: amiri@gonabad.ac.ir

2- Professor, Faculty of Agriculture, Ferdowsi University of Mashhad, Iran

3- Associate Professor, Faculty of Agriculture, Ferdowsi University of Mashhad, Iran

Abstract

In order to evaluation of ethnobotany and effect of natural habitatsz on characteristics of Iranian Ox-Tongue (*Echium amoenum* Fisch & Mey.), this research was conducted in 2014 year in two natural habitats of Kelardasht and Marzanabad in Mazandaran province. The results showed that Mean plant height, mean canopy diameter, mean lateral branch length, mean lateral branch number, mean flower number per plant and mean flower weight in plant was 35-70 cm, 25-60 cm, 30-65 cm, 10-40 lateral branches, 700-1420 flower per plant and 8-18 g, respectively, in different habitats. In the most of studied traits, plants of Kelardasht area were superior compared to plants of Marzanabad area, so that in Kelardasht area, plant height, conopy diameter, lateral branch length, lateral branch number, flower number per plant and flower dry weight per plant was 42, 57, 46, 63, 50 and 52% more than Marzanabad area, respectively. Total phenol, total flavonoide and total anthocyanin content in plants of Kelardasht area were 32, 23 and 38% more than Marzanabad area. Phenological cycles in natural habitat of Kelardasht was completed in 180 days equal to 2071 degree-days. The results of ethnobotany studies showed that indigenous people often use this plant as relaxing and exhilarating that was widely used in the treatment of colds and was more commonly used as pure herbal tea.

Keywords: Anthocyanin, Conopy diameter, flavonoide, Marzanabad, relaxing plant.

Germination characteristics and seedling growth of Iranian Ox-Tongue (*Echium amoenum*) affected by nutritional treatments

M.B. amiri[1*], P. Rezvani Moghaddam[2] and M. Jahan[3]

1*- Assistant Professor, Faculty of Agriculture, University of Gonabad, Iran

E-mail: amiri@gonabad.ac.ir

2- Professor, Faculty of Agriculture, Ferdowsi University of Mashhad, Iran

3- Associate Professor, Faculty of Agriculture, Ferdowsi University of Mashhad, Iran

Abstract

In order to evaluation of nutritional treatments on germination characteristics and seedling growth of Iranian Ox-Tongue (Echium amoenum), an experiment based on CRD design with three replications was conducted in 2014 year, in Ferdowsi University of Mashhad, Iran. The experimental treatments included 7 types of ecofriendly inputs: Humic acid, Fulvic acid, Nitroxin, Biophosphorous, Biosulfur, *Glomus mosseae*, *Glomus intraradices* and control. The results showed that organic acids of humic and fulvic increased germination percentage 25 and 20% and germination rate 58 and 33% compared to control, respectively. Germination percentage was 20, 25 and 24% more in biofertilizers of nitroxin, biophosphorous and biosulfur compared to control, respectively and germination rate under application of this fertilizers added 59, 24 and 50% compared to control, respectively. Humic acid, fulvic acid, nitroxin, biophosphorous, biosulfur, *Glomus mosseae* and *Glomus intraradices* reduced mean germination time 33, 35, 38, 19, 36, 36 and 16% compared to control, respectively. The highest radicle and plumule length obtained in treatment of humic acid and the highest radicle to plumule length observed in treatment of biosulfur. Fulvic acid increased radicle and plumule dry weight 51 and 38% compared to control, respectively. The highest and the lowest radicle to plumule dry weight obtained in treatments of *Glomus intraradices* and control, respectively.

Keywords: Biophosphorous, Germination Rate, *Glomus mosseae*, Organic Acid, Plumule Length

Effect of planting dates and methods and ecofriendly inputs on Germination Characteristics and Seeling Growth of Iranian Ox-Tongue (*Echium amoenum*) Seeds of Rootstock

M.B. amiri[1*], P. Rezvani Moghaddam[2] and M. Jahan[3]

1*- Assistant Professor, Faculty of Agriculture, University of Gonabad, Iran
E-mail: amiri@gonabad.ac.ir
2- Professor, Faculty of Agriculture, Ferdowsi University of Mashhad, Iran
3- Associate Professor, Faculty of Agriculture, Ferdowsi University of Mashhad, Iran

Abstract

In order to evaluation of effect of planting dates and methods and ecofriendly inputs on Germination Characteristics and Seeling Growth of Iranian Ox-Tongue (*Echium amoenum*), a split split plot experiment based on CRD design with three replications was conducted in 2014 year, in Ferdowsi University of Mashhad, Iran. The experimental treatments included seeds resulting from treated Iraninan Ox-Tongue with different agronomic factors in farm such as 2 planting dates (10 February and 3 April 2012), 2 planting methods (seed planting and transplanting) and 3 different types of biological and chemical fertilizers (mycorrhiza (*Glomus moseae*), biosulfur (included *Thiobacillus* spp.), chemical fertilizer and control). The results showed that mycorrhiza and biosulfur increased germination percentage 18 and 17% and improved germination rate 32 and 33% compared to control, respectively. Mean germination time in conditions of seed planting was less than transplanting conditions. Mycorrhiza application in conditions of seed planting increased radicle length to plumule length 44% compared to control. Effect of planting date was significant on radicle and plumule dry weight.

Keywords: *Glamus moseae*, Mean Germination Time, *Thiobacillus*, Radicle Length, Transplanting

Global trends in research on medicinal plants

Reza Mahdavi, Shahab Ghazi[1]

1. Department of Animal Science, College of Agriculture and Natural Resources, Razi University, Kermanshah.

Abstract

Herbal medicine refers to using a plant's seeds, berries, roots, leaves, bark, or flowers for medicinal purposes and they have been used for medicinal purposes since ancient times. More than 110,000 articles on medicinal plants have been published from1960 to 2019. Ethnopharmacology and herbal medicine are the origins of many modern medicines. However, identifying promising drug candidates is a difficult task that requires the use of both traditional and advanced modern screening technologies. The most of research have been carried out in the Pharmacology, Toxicology and Pharmaceutics category with of the total. The first three countries to publish articles on medicinal plants in 2019 include China, India and Iran. Most research has been done on several plant families, including Asteraceae, Fabaceae, Lamiaceae and Apocynaceae.

Keywords: Medicinal plants, global research trends

The effect of thymol on serum levels of total antioxidants (TAC) and tumor necrosis factor (TNF-α) in obese mice

Fateme Jalalvand

Department of Biology, Islamic Azad University, Malard Branch, Tehran, Iran

Email address: f.jalalvand@yahoo.com

Phone number: 09126443491

Abstract:

Obesity is the result of an unhealthy diet, a lack of antioxidants and unsaturated fats. Oxidative stress has a role in the onset of chronic diseases associated with obesity. Thymol is one of the phenolic compounds of thyme which is widely used as a general antiseptic in surgery, agriculture, cosmetics and nutrition industries. In a recent study, the effect of thymol on serum levels of total antioxidant (TAC) and tumor necrosis factor (TNF-α) in obese mice was investigated. The control and experimental groups were fed a standard and high-calorie diet for 8 weeks, respectively. The experimental group was gavaged with thymol (12 mg / kg / day) for 8 weeks. The end of treatment, blood samples, to investigate serum TAC and TNF-α was performed. Treatment of obese mice with thymol resulted in a significant increase in serum TAC levels and also a significant decrease in serum TNF-α levels compared to control mice. Because oxidative stress plays a pivotal role in the onset of chronic obesity-related diseases, thymol can be used to treat obesity and increase antioxidant levels.

Keywords: Thymol, Total Antioxidant, Factor Tumor Necrosis, Obese Mice

Investigating and survey of educational and professional relationship of apothecaries in Zanjan

Hossein Rabbi Angourani*[1], Ali Ammarellou[2], Morteza azizpour[3], Mohamad Bagher azizpour[4]

1,2-Assistant Professor Research Institue of Modern Biological Techniques, University of Zanjan, Zanjan, Iran.

3-Head of apothecariy guild in Zanjan and director of Golhaieh Dasht Andia Company

4- Instructor Of Traditional Medicine,Zanjan

Rabbihosein@znu.ac.ir

Abstract

Medicinal plants have a special value and importance in ensuring the health of communities and are responsible for the first step in ensuring health in people's lives. The aim of this study was to investigate the problems and issues of Attaran guild in Zanjan. At the request of this guild, job characteristics and level of knowledge and some characteristics of suppliers of medicinal plants in Zanjan were examined in five areas. Identified formed the city of Zanjan and in order to collect data was assessed by interviewing by completing and analyzing a questionnaire. The results showed that the average age of people working in Attari is 35.29 ± 10.37 years with a work experience of about 10.15 ±7.28 years, of which only 14.8% of these people have a university degree, of which 41.5% have a degree related to Plants and agriculture and 46.45% had a diploma and 71.15% had undergraduate education and had little knowledge of medicinal plants. High-demand herbs include cumin, thyme, peppermint, borage, valerian, lavender, turmeric, star anise, turmeric, black pepper, cinnamon, coriander, cardamom, ginger, lemon It turned out that those in charge of this science profession, except for a few large and old companies do not have basic knowledge in the field of traditional botanical medicine and medicinal plants, and it is necessary to take training courses in this regard.

Keywords: Apothecaries, Folk Medicine,,Medicinal Plants, Zanjan.

The effects of *Artemisia dracunculus* on the expression profiles of *IL-1β* and *TNFα* genes in Rainbow trout (*Oncorhynchus mykiss*)

Mehran Ghaemi[1], Mohammad-Foad Noorbakhsh[*2]

[1] Department of pathobiology, School of veterinary medicine, Shiraz University, Shiraz, Iran

[2] Department of basic science, School of veterinary medicine, Shiraz University, Shiraz, Iran

* Corresponding author: foad_noorbakhsh@yahoo.com

Abstract

The current research was conducted to examine the benefits of the administration of *Artemisia dracunculus* (AD) for the immune system of Rainbow trout (*Oncorhynchus mykiss*). Gene expression profiles of immune system including *IL-1β* and *TNFα* genes were evaluated by real time RT-PCR tests using TaqMan® probes. Firstly the extract from the aerial parts of AD was prepared. Then, the ingredients of the basal diet and the acquired AD extract were blended in an appropriate concentration to reach four experimental diets with various amounts of AD as follows: with 0 g (control group, 0 %), 1 %, 2 % and 3 % of AD plant extracts. Twenty four Rainbow trout (*O. mykiss*) juvenile, weighing on average 12.38 ± 0.10 g (mean±SD), were distributed randomly into 4 groups, fed the experimental diets for 8 weeks.

The gene expression analysis showed that *IL-1β* gene expression of the AD treatment groups from 1% (1.64 fold) to 3% (5.27 fold) is significantly up-regulated but *TNFα* gene expression is significantly down-regulated from 1% (0.93 fold) to 3% (0.11 fold). Treating with different amounts of AD extract suppressed *TNFα* gene expression in rainbow trout which is in agreement with the results of other phenolic phytocompounds treatments. Our result also showed that all concentrations increased *IL-1β* gene expression, significantly. More concentrated AD extract treatment, more IL-1β gene expression. Some phenolic compounds studies showed similar results. From both *TNFα* and *IL-1β* gene expression experiments, this could be concluded that the best concentration of AD extract for rainbow trout treatment is 2% which significantly up-regulates *IL-1β* but not significantly down-regulate *TNFα* (as an unwanted effect).

Keywords: *Artemisia dracunculus*, gene expression, immune system, Rainbow trout, real time RT-PCR

Herbal extract loaded nanofibers as a potential wound-dressing based on polycaprolactone (PCL)/chitosan (CN)/ *Melilotus officinalis* (*MO*)

Mohammad Shahrousvand [1], Mohsen Shahrousvand [2,*], Vahid Haddadi-Asl [3,*]

[1] Polymer Engineering Department, Chemistry Engineering Faculty, Tarbiat Modares University, Tehran, Iran

[2] Caspian Faculty of Engineering, College of Engineering, University of Tehran, P.O. Box 119-43841, Chooka Branch, Rezvanshahr, 4386156387, Guilan Province, Iran

[3] Department of Polymer Engineering and Color Technology, Amirkabir University of Technology, Hafez Avenue, 15875-4413 Tehran, Iran

Abstract

Melilotus Officinalis (MO) is a herbal extract that can be added to wound dressing systems as a drug. It is taken into consideration to treat acute and chronic ulcers, especially burn wounds and diabetic lesions. This drug has been found to have strong antioxidant components such as 7-hydroxycoumarin, flavonoids, and oleanane glucuronide. Due to these components, *MO* can be beneficial in reducing inflammation, regulating the immune system and improvement in vascularization. On the other hand, Electrospun nanofibers have many characteristics such as mimicking extracellular matrix structure, efficiency as bacterial barrier, appropriate water vapor transmission rate, and provision of adequate gaseous exchange which make them ideal candidates for wound-healing application. The aim of this study was to incorporate *MO* in electrospun nanofibers to benefit both the advantages of *MO* and electrospun nanofibers for the treatment of wounds. To this aim, the blend solution of polycaprolactone (PCL), chitosan (CN) and the herbal extract were electrospun and nanofibers loaded with the herbal extract were fabricated. Eventually, the optimized PCL/CN and PCL/CN/*MO* specimens were evaluated by Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), Tensile, water contact angle, antibacterial assays, cell viability, and drug release analysis for determining their function and properties.

Keywords: Polycaprolactone (PCL), Chitosan (CN), *Melilotus Officinalis* extract (*MO*), Electrospinning, Wound dressing.

Isolation and molecular identification of endophytic fungi from endemic plant *Rhabdosciadium aucheri*

Reza Habibipour[1], Nooshin Khoshnevis[1], Mohsen Rajabi[1,2*]

1. Department of Microbiology, Hamedan Branch, Islamic Azad University, Hamedan, Iran.
2. Natural Resources Department, Hamedan Agricultural and Natural Resources Research and Education Center, AREEO, Hamedan, Iran.

*Corresponding author m.rajabi@areeo.ac.ir

Abstract:

Endophytes are micro-organisms that inhabit into tissues of plants without any obvious signs. All vascular and non-vascular plants on land and sea are the habitat of endophytic fungi. Presence of endophytic microorganisms in herbaceous and woody tissues of all plant organs including roots, Stem, Branch, Skin, Leaves petiole, Flower, Fruit and seed has been proved. Endophytic flora is varied in different hosts based on population and diversity and it depends on the geographical location of the host. *Rhabdosciadium aucheri* belongs to the Apiaceae family, an exclusive species of Iran that grows in the provinces of Hamedan, Lorestan, Chaharmahal and Bakhtiari Kohgiluyeh and Boyer-Ahmad and Tehran. The aim of this study was to isolate and molecular identification of endophytic fungi in *Rhabdosciadium aucheri*, an endemic plant of Hamadan province. The plant was collected in spring, 22 July 2020 from different parts of Hamadan province. After surface disinfection and cutting into smaller pieces, the samples were cultured in PDA medium and examined after coding and initial growth. Identified species include *Altrnaria radicina*, *Altrnaria rosae*, *Altrnaria* sp., *Altrnaria carotiincuitae*, *Penicillum* sp., *Penicillum sanguifluum*, *Paraphoma radicina*, *Neonectria candida*, *Cadophora* sp., *Montagnula* sp. In this study, the most abundant isolated fungi belong to the genus *Altrnaria radicina*, which has the highest abundance in the roots of the plant related to Imamzadeh Kuh region. Genus *Penicillum* sp., *Paraphoma radicina* and *Neonectria candida*, which have the highest abundance of endophytic fungi in the roots of Tuyserkan Ski slope, respectively. All species introduced for the first time as endophytic fungi from *Rhabdosciadium aucheri*, an endemic plant, are reported in Iran and the world. This study is the first study of endophytic fungi from the *Rhabdosciadium aucheri* in Iran and the world.

Keywords: Molecular identification, Endophytic fungus, *Rhabdosciadium aucheri*

The effects of fennel on menstrual bleeding: A systematic review and meta-analysis

Nafiseh Ghassab-Abdollahi[1], Mojgan Mirghafourvand[2,3*], Sanaz Mollazadeh[2]

[1] Department of Health Education & Promotion, School of Health, Students' Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran. Email: nnn.gassabnnn@gmail.com

[2]Department of Midwifery, Faculty of Nursing and Midwifery, Tabriz University of Medical sciences, Tabriz, Iran

[3]Social determinants of Health Research Center, Tabriz University of Medical sciences, Tabriz, Iran

*Corresponding author: Mojgan Mirghafurvand, Associate Professor, Nursing and Midwifery Faculty, Midwifery Department, Tabriz University of Medical sciences, Tabriz, Iran

E-mail: mirghafourvandm@tbzmed.ac.ir, Phone: 00989143206121

Abstract

Introduction: Given the widespread use of herbal medicine among women for menstrual problems, it is important to evaluate the effectiveness of fennel on menstrual bleeding.

Objectives: the present study was conducted to determine the effect of fennel on the amount (primary outcome) and duration of menstrual bleeding and its side-effects (secondary outcomes).

Methods: The databases were searched using MeSH terms. Two authors separately reviewed the inclusion criteria. Quality assessment of randomized clinical trials was conducted using the Cochrane criteria.

Results: Six articles were included in the study and four articles entered into the meta-analysis. The results from meta-analysis showed that using fennel caused a significant increase in mean menstrual bleeding in the first cycle after treatment in the intervention group compared to the control (Std. Mean Difference: 0.46; 95% CI: 0.18 to 0.73; P=0.001; I^2=9%). However, it had

no significant effect on menstrual bleeding in the second cycle after treatment (Mean Difference: 1.44; 95% CI:-5.09 to 7.96; P=0.67; I^2=0%). The results of meta-analysis of four articles showed that in the first cycle after treatment, use of fennel increased menstrual bleeding in the intervention group compared to the control, but meta-analysis of two articles showed no significant difference between intervention and control groups in the amount of menstrual bleeding in the second cycle after treatment.

Conclusion: Given the poor quality of included studies, conducting clinical trials to determine the effect of fennel on menstrual bleeding appears necessary.

Keywords: Fennel, *Foeniculum vulgare*, Menstrual bleeding, Systematic review

computational molecular docking simulation study of Kojic acid glucoside as antibacterial agents

Omid Ali Behzadi, Azizeh Asadzadeh

Department of Biology, Faculty of Basic Sciences, Nourdanesh Institute of Higher Education, Meymeh, Isfahan, Iran

Background & Objective: Kojic acid is a fungal metabolic product produced by a few species of *Aspergillus*, especially by *A. oryzae*, which has the Japanese common name koji. This compound is an inhibitor of growth of bacteria and multiplication of viruses. In this study, kojic acid derivative, Kojic acid glucoside, was evaluated as DNA gyrase activity inhibitors. DNA gyrase has long been known as an attractive target for antibacterial drugs.

Material & Methods:In order to investigate the mode of interaction of the compound with DNA gyrase active site, the chemical structures of kojic acid glucoside wase designed using ChemDraw program, then transferred into Hyperchem software for energy minimization. Docking study was performed by AutoDock 4.2 program and the resulting docking poses were analyzed in AutoDockTools, DS Visualizer 3.5 and Ligplot software.

Results: Binding model and the best docked pose of this compound showed Kojic acid glucoside formed a hydrogen bond with Asp73,Asn46, Glu50, Thr165, Val71,Arg136 of DNA gyrase in active site.

Conclusion: The *in silico* molecular docking study results showed that, Kojic acid glucoside have minimum binding energy and good affinity toward the active pocket, thus, this may be considered as good inhibitor of DNA gyrase .

Keywords: enzyme inhibition, molecular Docking, Kojic acid glucoside, DNA gyrase

Bioinformatic studies of the effect of Curcumin glucuronide in the plants of the Curcuma longa species on DNA gyrase inhibition as antimicrobial agent

Farideh Ebrahimi[1], Azizeh Asadzadeh[2]

1. Department of Biology, Zand Institute of Higher Education, Shiraz, Iran

2. Department of Biology, Faculty of Basic Sciences, Nourdanesh Institute of Higher Education, Meymeh, Isfahan, Iran

Background & Objective: DNA gyrase is an essential bacterial enzyme that catalyzes the ATP-dependent negative super-coiling of double-stranded closed-circular DNA. DNA gyrase has long been known as an attractive target for antibacterial drugs. Curcumin is a polyphenol, found in the spice turmeric, that has promising anticancer and antimicrobial properties. The aim of this research is the bioinformatical study of DNA gyrase inhibition by a Curcumin derivative.

Material & Methods:In order to investigate the mode of interaction of the compound with DNA gyrase active site, the chemical structure of Curcumin glucuronide wase designed using ChemDraw program, then transferred into Hyperchem software for energy minimization. Docking study was performed by AutoDock 4.2 program and the resulting docking poses were analyzed in AutoDockTools, DS Visualizer 3.5 and Ligplot software.

Results: Curcumin glucuronide was able to occupy the active site of the enzyme. In fact, this compound indicated favorable interactions with the key amino acid residues at active site of DNA gyrase. Docking results for this compound are in accordance with those of co-crystallized ligand. The Gly77, Glu50, Thr165, Val71 of DNA gyrase were the sites for hydrogen bonding interactions with this compound.

Conclusion: Finally, in respect to high effectiveness and docking results, we can conclude that the Curcumin glucuronide may be regarded as antimicrobial agent.

Keywords: In Silico Approach, Docking, Curcumin glucuronide, DNA gyrase

Evaluation of Antibacterial and Antioxidant effect of *Ziziphora tenuior* essential oil, native to Zanjan province.

Shayan Sadeghilar[1], Amirsaleh Karimi[1], Alireza Yazdinezhad[2], Mehran Mohseni[1]

[1] Department of Food and Drug Control, School of Pharmacy, Zanjan University of Medical Sciences, Zanjan, Iran;
[2] Department of Pharmacognosy, School of Pharmacy, Zanjan University of Medical Sciences, Zanjan, Iran;

Abstract

In the present investigation, the chemical compositions and evaluation of Antibacterial and Antioxidant effect of *Ziziphora tenuior* essential oil were examined. The chemical compositions analyzed with GC–MS. The antibacterial activity of essential oil of *Ziziphora* tenuior was tested against *Bacillus subtilis*, *Salmonella typhi*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Staphylococcus epidermidis*, *Klebsiella pneumonia* by agar well diffusion method, Minimum inhibitory concentrations (MICs) and Minimum bactericidal concentration (MBC). *Ziziphora tenuior* had several level of antibacterial activities (MIC>0.625 µg/mL & MBC>1.25 µg/mL). Antioxidant activity of essential oil of *Ziziphora tenuior* were determined by total phenolic with 169.33 ± 7.02 GAE mg/g, DPPH- radical-scavenging activities with significant differences ($P<0.05$) among IC_{50} 798.71 ± 7.91 mg/L comparable to garlic acid (61.20 ± 1.67 mg/L), Ferric reducing antioxidant power assay (FRAP) with significant differences ($P<0.05$) among Absorption of essential oil comparable to standard (ascorbic acid), Hydroxyl Radical Scavenging Activity (HRSA) with significant differences ($P<0.05$) among IC_{50} of essential oil of *Ziziphora tenuior* (8.01 ± 0.17 mg/mL) comparable to ascorbic acid (0.12 ± 0.005 mg/mL) and Ferrous ion chelation with significant differences ($P<0.05$) among IC_{50} of essential oil of *Ziziphora tenuior* (79.54 ± 2.98 µg/mL) comparable to EDTA (0.72 ± 0.015 µg/mL). *Ziziphora tenuior* in all determining methods had several level of antioxidant and antibacterial activities.

Keywords: Antibacterial, Antioxidant, MIC, MBC, phenolic content, DPPH, FRAP, HRSA, Ferrous ion chelation, Zanjan, *Ziziphora tenuior*.

The beneficial Effects of Grape seed oil on Brain oxidative markers due to Chronic Lead Exposure in Male Rats

Mahdieh Anoush[1], Shima Rahmani[1], Mehran Mohseni[2], Mir Jamal Hosseini[3*]

[1]Department of Pharmacology & Toxicology, School of Pharmacy, Zanjan University of Medical Sciences, Zanjan, Iran

[2:] Department of Food and drug control, School of Pharmacy, Zanjan University of Medical Sciences, Zanjan, Iran.

[3] Applied Pharmacology Research Centre, School of Pharmacy, Zanjan University of Medical Sciences, Zanjan, Iran.

Introduction: Lead (Pb) toxicity remains a significant and hazardous global health problem because of its vast application and diverse adverse effects on the renal system. Oxidative stress plays a key role in lead-induced toxicity specially neuro and nephrotoxicity. The main goal of the present study is to clarify the possible protective role of grape seed oil on the neurotoxicity induced by lead acetate as well as its effects on plasma and brain concentrations of Lead acetate.

Material and methods: In this study, 48 male Sprague-Dawley adult male rats were used. They divided into 6 groups and received drugs (scopolamine IP injections, grape seed oil oral gavage, lead acetate dissolved in the drinking water & distilled water gavage) according to a 60 days protocol. After 60 days of treatments the brain tissues were extracted and FRAP test, protein carbonylation, lipid peroxidation and glutathione levels in brain tissues were determined using spectrometry methods.

Results: The results showed that the level of oxidative stress in the test group was significantly increased compared to the control group, which included a decrease (P <0.001) in the amount of regenerative glutathione and in antioxidant power as well as an increase in malondialdehyde and carbonyl protein. The results of the antioxidant effect of grape seed oil showed that it can significantly reduce oxidants in brain tissue of all animals after chronic exposure to lead acetate.

Discussion and Conclusion: According to the results, chronic exposure to lead acetate can cause glutathione depletion, lipid peroxidation and protein carbonylation impairment which is similar to that of scopolamine (the standard model for Alzheimer's induction). Also, grape seed oil can reduce the neurological damages and all oxidative markers caused by chronic toxicity with lead acetate.

Keywords: Lead acetate, Grape seed oil, Brain, FRAP, Lipid peroxidation, Glutathione

Investigating the Effects of Grape seed oil on Chronic Copper Induced Neurotoxicity and Brain copper Concentration in Male Rats

Mahdieh Anoush[1], Hossein Falahatdari[1], Mehran Mohseni[2], Mir Jamal Hosseini[3*]

[1]Department of Pharmacology & Toxicology, School of Pharmacy, Zanjan University of Medical Sciences, Zanjan, Iran
[2:] Department of Food and drug control, School of Pharmacy, Zanjan University of Medical Sciences, Zanjan, Iran.
[3] Applied Pharmacology Research Centre, School of Pharmacy, Zanjan University of Medical Sciences, Zanjan, Iran.

Introduction: Copper is the 29th element on the periodic table and is a transition metal. It can pollute soil and water and there is a narrow range between its beneficial and harmful effects. Regarding to spatial memory impairment in high aged adults in industrial countries and considering the anti-oxidant and anti-aging effects of grape seed oil, we determined to evaluate the probable neuroprotective effects of grape seed oil on chronic copper toxicity. In this study the effects of chronic copper exposure on brain oxidative markers were evaluated and the possible protective effects of grape seed oil on different oxidative and neurotoxic parameters were assessed.

Material and methods: In this study, 42 Sprague-Dawley adult male rats were used. They divided into 6 groups and received drugs (copper sulfate dissolved in their daily drinking water and sweetened with glucose) for 60 consecutive days, standard grape seed oil oral gavage from day 30 to day 60 in every other day, and scopolamine IP injections during last 10 days, and distilled water gavage as sham group. After 60 days of treatments the brain tissues were extracted and FRAP test, protein carbonylation, lipid peroxidation and glutathione levels in brain tissues were determined using spectrometry methods. The brain copper levels were also determined in all animals using atomic absorption.

Results: The results showed that the level of oxidative stress in the test group was significantly increased compared to the control group, which included a decrease (P <0.001) in the amount of regenerative glutathione and in antioxidant power as well as an increase in malondialdehyde and carbonyl protein. The results of the antioxidant effect of grape seed oil showed that it can significantly reduce oxidants in brain tissue of all animals after chronic exposure to copper sulfate. Brain levels of copper were significantly decreased in copper exposure groups which had received grape seed oil (P<0.05)

Discussion and Conclusion: According to the results, chronic exposure to copper sulfate can cause glutathione depletion, lipid peroxidation and protein carbonylation impairment which is similar to that of scopolamine (the standard model for Alzheimer's induction). Besides, grape seed oil was capable of reducing the brain copper levels in comparison with control group.

Keywords: Copper (Cu++), Grape seed oil, Brain, FRAP, Lipid peroxidation, Glutathione

Comparative study of seed germination and growth indices of *Carum copticum L.* seedlings under micrometer and nanometer zinc oxide treatments

Maryam Mazaheri-Tirani [a*] and Soleyman Dayani [b]

[a] Department of Biology, Faculty of Science, University of Jiroft, Jiroft 78671-61167, Iran
https://orcid.org/0000-0003-4643-8967

[b] Department of Agricultural Biotechnology, Payame Noor University (PNU), P.O. Box 19395-4697 Tehran, Iran, https://orcid.org/0000-0002-8639-7867
*Corresponding author: Tel.: +98(0) 3443260061; Fax: +98(0) 3443260065. mazaheri@ujiroft.ac.ir

Abstract

Seed germination and survival of seedlings are very sensitive to heavy metals. This study investigated effects of commercial micron ZnO (<1,000 nm) and nano ZnO (25 nm) on Ajwain (*Carum copticum L.*). Seeds were treated with eleven concentrations of micro and nano ZnO (0, 0.04, 0.2, 2.5, 5, 10, 50, 100, 500, 1000 and 2000 ppm). The number of seeds germination in 14th days with 2 d intervals after incubation was measured. Then, quantitative traits were investigated after 21 days. Our results showed that micron and nano-sized ZnO concentrations at lower than 5 ppm concentration improved the seedlings elongation and some growth indices, but concentrations higher than 10 ppm levels of m-ZnO or n-ZnO acted as the main limiting factors for seed germination, and declined survival seedlings rate. Overall, micro ZnO treatments had a more negative effect on seedlings growth compared with that of ZnO. The concentrations above 100 ppm of the two forms of ZnO resulted in agglomeration into media.

Keywords: Heavy metal, ZnO, nanoparticles, toxicity, Ajwain, seedlings survival

Molecular docking study of COVID-19 main protease with pollen components for discovery of antiviral inhibitors

Armin Zarei[a*], Ali Ramazani[a,b]

[a]Department of Chemistry, Faculty of Science, University of Zanjan, Zanjan 45371-38791, Iran

[b]Department of Biotechnology, Research Institute of Modern Biological Techniques (RIMBT), University of Zanjan, Zanjan 45371-38791, Iran

Abstract

The arrival of new types of viral diseases, namely coronavirus family, have posed a serious threat for global health. A new kind of coronavirus (CoV) named intense respiratory syndrome CoV-2 (SARS-CoV-2 or COVID-19) firstly diagnosed in Huanan Seafood Wholesale, Wuhan City, China. One of the best way to find trusted drugs is molecular docking consideration of natural products as it is a cost-friendly and time-sufficient way. Honey bee natural products like pollen are rich in flavonoids, which show good bio-active features, so *in silico* screening of their components is worthy due to find antiviral candidates against COVID-19 main protease. In this research, molecular docking simulations of pollen components conducted with the active site of COVID-19 main protease. Finally, 110 compounds and 10 marketed drugs as standard were rigidly docked into active site of main protease and then those compounds with lowest binding energies were chosen for flexible docking in order to investigation of antiviral drugs against COVID-19.

Keywords: Covid-19, molecular docking, drug discovery, natural products