21st National
9th International
Congress on Biology

Plant Biology

Semnan University, Semnan, Iran

16-19 Feb. 2021

Semnan University

Iranian Biology Society

FIRBS
Federation of Iran Bioscience Societies

United Nations Educational, Scientific and Cultural Organization

UNITWIN Network in Global Pharmacy Education Development

Iranian Society of Plant Physiology

I.G.S.
انجمن ژنتیک ایران
Iranian Genetics Society

Biosafety Society of Iran

Iranian Society Prebiotic and Functional Foods

انجمن علمی پارک های علوم و فناوری و مراکز رشد ایران

Iranian Association for Plant Cell and Tissue Culture

IPPA
AltitudeClinic

IBIS
انجمن بیوانفورماتیک ایران
Iranian Bioinformatics Society (IBIS)

ICTCA
Iranian Cell & Tissue Culture Association

انجمن ژنتیک‌شناسان ایران

Welcome to

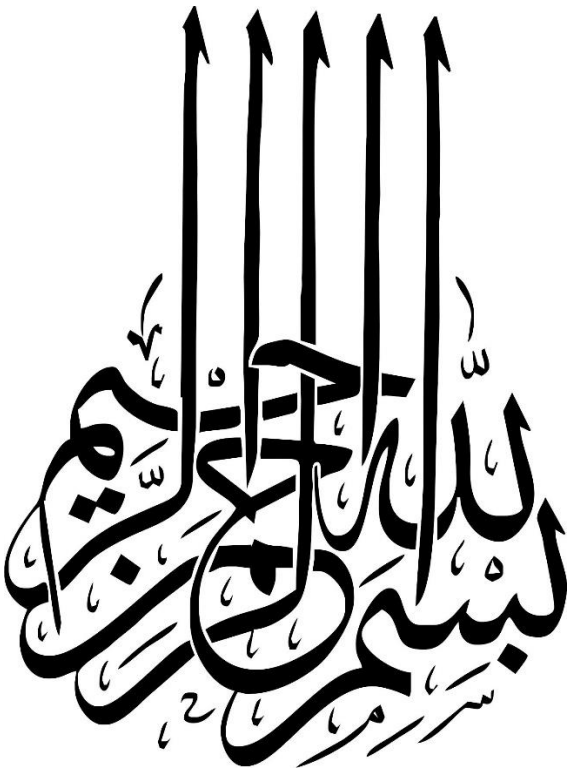
IBS

2021

Conference On

Plant Biology

21st National & 9th International Congress On Biology


بسم الله الرحمن الرحيم

Abstracts

of

21st National & 9th International Congress on Biology

Conference on Plant Biology

16-19 Feb. 2021

Semnan

IRAN

Websites: http://ibs2020.semnan.ac.ir/en/; https://ibs.org.ir/; https://semnan.ac.ir/; https://biology.semnan.ac.ir/

Edit, Layout and Preparation by Darvishalipour A. Shakiba and Abolmaali Shamsozoha

Name Index

This congress was indexed by ISC (# 99200-22082) and CIVILICA (# BIOCONF21).

Preface

The Iranian Biology Society and Semnan University are honored to held the **21st National and 9th International Congress on Biology** on 16th to 19th February 2021 inclusive, in Semnan, Iran. The main aim of the event is to present frontline bioscience helping to acknowledge sever challenges dealing with global environmental treats in our planet. Also, we aimed to provide a way of communication among peers of young scientists and students locally and internationally. It also intends to provide an interdisciplinary platform to present and discuss the most recent innovations, trends, and concerns along with practical challenges surrounding biological sciences. The congress consists of four concurrent conferences on major Biology disciplines (Plant Biology; Animal Biology; Cell and Molecular Biology; and Conservation and Environmental Biology). Meanwhile, a prominent event includes a special panel on coronavirus disease 2019 (COVID-19) concerning molecular and cellular approaches. In the amid of the current global pandemic, Semnan University and Iranian Biology Society hold on an *International Virtual Symposium on the Biological, Clinical and Basic Science approaches to Covid-19*, at the 21st National and 9th International Congress on Biology in Semnan University, Semnan, Iran.

This proceeding is one the six abstract books, including abstract books for Plant Biology, Animal Biology, Cell and Molecular Biology, and Conservation and Environmental Biology conferences and a Persian version of the content of the abstracts altogether, and one last booklet for COVID-19 symposium. We hope the knowledge and experience of biologists to be shared during the 21st National and 9th International Congress on Biology benefits all parties involved and beyond.

Executive Committee
21st National and 9th International Congress on Biology

Executive Board

President
Dr. Masoud Nasiri
Semnan University, Iran

Vice-President
Dr. Seyfolah Saedodin
Semnan University, Iran

Director
Dr. Mohammad Nabiuni
Kharazmi University, Iran

Manager
Dr. Shamsozoha Abolmaali
Semnan University, Iran

IBS Excutive Advisor
Dr. Ali Farazmand
University of Tehran, Iran

IBS Excutive Advisor
Dr. Abasalt Hosseinzadeh
University of Mazandaran, Iran

Executive Program Committee

Dr. Fatemeh Rabizadeh (Scientific Secretary of **Plant Biology** Conference, Semnan University)
Dr. Mehdi Golestaninasab (Scientific Secretary of **Animal Biology** Conference, Semnan University)
Dr. Farshid Parvini (Scientific Secretary of **Cell and Molecular Biology** Conference, Semnan University)
Dr. Shakiba Darvishalipour Astaneh (Scientific Secretary of **Conservation and Environmental Biology** Conference, Semnan University)

Executive Committee

Dr. Mehdi Golestaninasab
Dr. Shakiba Darvish Alipour
Dr. Mahdi Sadeghi
M.Sc. Amir Hossein Bandali
Dr. Nooshin Bijari
Dr. Robabeh Latif
Dr. Sepideh Sepehri
Dr. Rahman Marefat
Dr. Mohammad Hossein Ehsani
M.Sc. Asadolah Mohamadnejad
M.Sc. Koosha Abedininasab
M.Sc. Zahra Taghizadeh
M.Sc. Monireh Zarei
M.Sc. Mahsa Salavatian
M.Sc. Atefeh Karimi
M.Sc. Rahimeh Khavari
M.Sc. Mojtaba Dostmohammadi
M.Sc. Mohammad Shahab
Mr. Ali Hassan abadi
Diploma Nilofar Pourkamali
Diploma Naeemeh Shoghi
Diploma Mohammad Karvar

Scientific Committee

Dr. Adcock Ian
(Imperial College London, London, UK)
Dr. Iqbal Alam
(Jamia Hamdard, New Delhi, India)
Dr. Muhammad Arshad Javed
(University Technology Malaysia)
Dr. Ayrapetyan Sinerik
(UNESCO Chair in Life Sciences, Armenia)
Dr. Das Kusal K.
(Faculty of Medicine, BLDE, Karnataka)
Dr. Ebrahimzadeh Hasan
(University of Tehran)
Dr. Kurt Latif
(Ankara University, Ankara, Turkey)
Dr. Maghuly Fatemeh
(University of Natural Resources and Life Sciences Vienna, BOKU)
Dr. Moosavi-Movahedi AliAkbar
(University of Tehran)
Dr. Nobel Denis
(University of Oxford, Oxford, UK)
Dr. Summerlee Alastair
(University of Guelph, Guelph, Canada)
Dr. Zubieta-Calleja Gustavo
(Institute (HAPPI-IPPA) La Paz, Bolivia)
Dr. Ewing Rob
(University of Southampton)
Dr. Palacio Sara
(James Hutton Institute, Craigiebuckler, Aberdeen, UK)
Dr. Miyan Jaleel
(University of Manchester, Manchester, UK)

Dr. Abdoli Asghar
(Shahid Beheshti University)
Dr. Abtahi Behrooz
(Shahid Beheshti University)
Dr. Afshar Mohammadian Mansour
(University of Guilan)
Dr. Aliabadian Mansour
(Tarbiat Modares University)
Dr. Allahi Elahe
(University of Tehran)
Dr. Amiri Mojtaba
(Semnan University)
Dr. Amoozegar Mohammad Ali
(University of Tehran)
Dr. Arab Najafi Seyed Mahmoud
(University of Tehran)
Dr. Asadi Mostafa
(Agricultural Research, Education and Extension Organization)
Dr. Atazadeh Ehsan
(University of Tabriz)
Dr. Atri Morteza
(Bu-Ali Sina University)
Dr. Attar Farideh
(University of Tehran)
Dr. Azin Mehrdad
(Iranian Research Organization for Science and Technology)
Dr. Bahaoddini Aminollah
(Shiraz University)
Dr. Baharvand Hossein
(Royan Institute for Stem Cell Biology and Technology)
Dr. Bahrami Ahmad Reza
(Ferdowsi University of Mashhad)
Dr. Behnam-Rassouli Morteza
(Ferdowsi University)
Dr. Bigdeli Mohammad Reza
(Shahid Beheshti University)
Dr. Boozari Saeed
(Pasteur Institute of Iran)
Dr. Changizi Emad
(Semnan University)
Dr. Chehregani Abdolkarim
(Bu-Ali Sina University)
Dr. Darvishi Farshad
(Alzahra University)
Dr. Esmaeili Hamid Reza
(Shiraz University)
Dr. Farazmand Ali
(University of Tehran)
Dr. Feizabadi Mohamad Mehdi
(Tehran University of Medical Sciences)
Dr. Fooladi Jamshid
(Alzahra University)
Dr. Ghahghae Arezou
(University of Sistanand Baluchestan)
Dr. Ghanati Faezeh
(Tarbiat Modares University)
Dr. Ghasempouri Seyed Mahmoud
(Tarbiat Modares University)
Dr. Ghazanfari Moghaddam Ahmad
(Shahid Bahonar University of Kerman)
Dr. Gholipour Abbas
(Payame Noor University)

Dr. Habibi rezaei Mehran
(University of Tehran)
Dr. Hamedi Javad
(University of Tehran)
Dr. Hosseinkhani Saman
(Tarbiat Modares University)
Dr. Hosseinzadeh Colagar Abasalt
(University of Mazandaran)
Dr. Hosseinzadeh Namin Monir
(Alzahra University)
Dr. Iranbakhsh Alireza
(Islamic Azad University)
Dr. Jamzad Ziba
(Research Institute of Forests & Rangelands)
Dr. Karami Manijeh
(Shahed University)
Dr. Karamian Roya
(Bu-Ali Sina University)
Dr. Karimi Farah
(Shahed University)
Dr. Kazemi Abdolhassan
(Tabriz University of Medical Sciences)
Dr. Kazempour osaloo Shahrokh
(Tarbiat Modares University)
Dr. Keshavarzi Maryam
(Alzahra University)
Dr. Keykhosravi Alireza
(Hakim Sabzevari University)
Dr. Khajeh Khosro
(Tarbiat Modares University)
Dr. Kianirad Mehran
(Iranian Research Organization for Science and Technology)
Dr. Kiarostami Khadijeh
(Alzahra University)
Dr. Maassoumi Ali Asghar
(Research Institute of Forests and Rangelands)
Dr. Majd Ahmad
(Islamic Azad University, North Tehran Branch)
Dr. Malek Masoumeh
(University of Tehran)
Dr. Mashayekhi Farhad
(University of Guilan)
Dr. Mirshamsi Omid
(Ferdowsi University)
Dr. Mobasheri Hamid
(University of Tehran)
Dr. Moghadam Matin Maryam
(Ferdowsi University)
Dr. Mohammadi Parisa
(Alzahra University)
Dr. Momeni-Moghaddam Madjid
(Hakim Sabzevari University)
Dr. Motallebi Mostafa
(National Institute of Genetic Engineering and Biotechnology)
Dr. Motevalian Seyed Abbas
(Iran University of Medical Sciences)
Dr. Mousavi Amir
(National Institute of Genetic Engineering and Biotechnology)
Dr. Mousavi Gargari Seyed Latif
(Shahed University)
Dr. Naderi manesh Hossein
(Tarbiat Modares University)
Dr. Naderloo Reza
(University of Tehran)
Dr. Nami Mohammad
(Shiraz University of Medical Sciences)
Dr. Naqinezhad Alireza
(University of Mazandaran)
Dr. Nasri Sima
(Payame Noor University)
Dr. Nazembokaee Zahra
(Alzahra University)
Dr. Niknam Vahid
(University of Tehran)
Dr. Oryan Shahrbanoo
(Kharazmi University)
Dr. Pakravan fard Maneezheh
(Alzahra University)
Dr. Pashaei Rad Shahrokh
(Shahid Beheshti University)
Dr. Rahimian Hassan
(University of Tehran)
Dr. Rahiminejad Mohammad Reza
(University of Isfahan)
Dr. Rajabian Tayebeh
(Shahed University)
Dr. Rajaei Homa
(Shiraz University)
Dr. Ranjbar Bijan
(Tarbiat Modares University)
Dr. Ranjbar Massoud
(Bu-Ali Sina University)
Dr. Rasooli Iraj
(Shahed University)
Dr. Rastegar Pouyani Eskandar
(Hakim Sabzevari University)
Dr. Rastegar Poyani Nasrullah
(Razi University)
Dr. Rezayof Ameneh
(University of Tehran)
Dr. Rezvani Mohammad
(Payame Noor University)
Dr. Saboora Azra
(Alzahra University)
Dr. Saboori Alireza
(University of Tehran)
Dr. Salehi Zivar
(University of Guilan)

Dr. Salmanian Ali Hatef
(National Institute of Genetic Engineering and Biotechnology)
Dr. Sari Alireza
(University of Tehran)
Dr. Semnanian Saeed
(Tarbiat Modares University)
Dr. Sepehri Houri
(University of Tehran)
Dr. Shabanipour Nader
(University of Guilan)
Dr. Sharifi Mohsen
(Tarbiat Modares University)
Dr. Sharifi Mozafar
(Razi University)
Dr. Shirzadian Saeed
(Agricultural Research, Education, and Extension Organization)
Dr. Sisakhtnezhad Sajjad
(Razi University)
Dr. Soudi Mohammad Reza
(Alzahra University)
Dr. Vatandoost Jafar
(Hakim Sabzevari University)
Dr. Yazdani Mohammad reza
(Semnan University)
Dr. Yazdanparast Razieh
(University of Tehran)
Dr. Younesi Habibollah
(Tarbiat Modares University)
Dr. Yousefzadeh Hamed
(Tarbiat Modares University)
Dr. Zamani Mohammadreza
(National Institute of Genetic Engineering and Biotechnology)
Dr. Zare Habib
(Agricultural and Natural Resources Center of Mazandaran)
Dr. Zare maivan Hassan
(Tarbiat Modares University)
Dr. Zare Mobarakeh Shahin
(University of Tehran)
Dr. Zare Rasoul
(Iranian Research Institute of Plant Protection)
Dr. Zarrabi Mahboobeh
(Alzahra University)
Dr. Zeynali Bahman
(University of Tehran)

Referees

Dr. Abbasi Shabnam
Dr. Afarinesh Mohammad Reza
Dr. Afshar Mohammadian Mansour
Dr. Aghdasi Mahnaz
Dr. Ahmadi Shamsuddin
Dr. Ahmadniaye Hamidreza
Dr. Akhavan Azadeh
Dr. Akmali Vahid
Dr. Alijanpour Sakineh
Dr. Alipour Hamzeh
Dr. Amani Jafar
Dr. Amini Elham
Dr. Amirahmadi Atefeh
Dr. Amiri Mojtaba
Dr. Arab Najafi Seyed Mahmoud
Dr. Arabzadeh Somaye
Dr. Atabaki Rabi
Dr. Atazadeh Ehsan
Dr. Attari Farnosh
Dr. Azamat Jafar
Dr. Azami Nasrin Sadat
Dr. Azimzadeh Irani Maryam
Dr. Azizi Vahid
Dr. Babakhanzadeh Esmail
Dr. Bagheri Ali
Dr. Bahadori Farzaneh
Dr. Baharara Javad
Dr. Bakhshandeh Behnaz
Dr. Bakhshayeshan Agdam Hamideh
Dr. Banaei-Moghaddam Ali Mohammad
Dr. Beheshti Siamak
Dr. Beirami Elmira
Dr. Bigdeli Mohammad Reza
Dr. Bijari Nooshin
Dr. Chamani Reyhaneh
Dr. Davoodi Jamshid
Dr. Elahdadi Salmani Mahmoud
Dr. Eslami Farouji Atena
Dr. Esmaeili-Rineh Somayeh
Dr. Fahimi Hossein
Dr. Fathinia Behzad
Dr. Foroughmand Ali Mohammad
Dr. Ghadam Parinaz
Dr. Ghadami Seyed Abolghasem
Dr. Ghaderi Ali
Dr. Ghaderzadeh Mohammad
Dr. Ghahghaei Arezou
Dr. Ghanati Faezeh
Dr. Ghanbar Majid
Dr. Ghanbari Fardi Mehdi
Dr. Gharaghani Sajjad
Dr. Ghasempouri Seyed Mahmoud
Dr. Ghobeh Maryam
Dr. Gholipour Abbas
Dr. Ghorbanalizadeh Atefeh
Dr. Golzarianpour Kiavash
Dr. Hadi Alavi Sayyed Mohammad
Dr. Hakimitabar Masoud
Dr. Hamzeh Behnam
Dr. Haseli Mohammad
Dr. Hassani Fateme
Dr. Hassani Seyedeh Batool
Dr. Hassanlou Maryam
Dr. Hassanpour Halimeh
Dr. Hekmat Azadeh
Dr. Hojati Vida
Dr. Hossein Ghamartaj
Dr. Hosseinian Seyed Saeid
Dr. Iranbakhsh Alireza
Dr. Jafari Farzaneh
Dr. Jafari Hanieh
Dr. Jalali Hanieh
Dr. Jalilian Nastaran
Dr. Javanmardi Kazem
Dr. Jonoubi Parissa
Dr. Jookar Kashi Fereshteh
Dr. Kafshdouzan Khatereh
Dr. Karami Manizheh
Dr. Karamian Roya
Dr. Kazemi Shahrooz
Dr. Keikhosravi Alireza
Dr. Khakdan Fatemeh
Dr. Khalaj-Kondori Mohammad
Dr. Khalaj-Pirbalouty Valiallah
Dr. Khaleghzadeh Ahangar Hossein
Dr. Khanpour Narges
Dr. Kharrazi Seyedeh Mahdiyeh
Dr. Khatami Faezeh
Dr. Khatibi Ali
Dr. Khoshdel Alireza
Dr. Kiani Kiandokht
Dr. Kiani Sahar
Dr. Lari Roya
Dr. Latif Robabeh
Dr. Lohrasebi Tahmineh
Dr. Maghami Parvaneh
Dr. Maghsoudlou Abdolvahab
Dr. Mahdavian Kobra
Dr. Mahdiuni Hamid
Dr. Makhdomi Kakhki Ali
Dr. Maleki Loghman
Dr. Malekzadeh Parviz
Dr. Mashayekhi Farhad
Dr.Masoomi Jahandizi Reza
Dr. Mehdigholi Kazem
Dr. Minai-Tehrani Dariush
Dr. Mirazi Naser
Dr. Mirshamsi Kakhki Omid
Dr. Mirzaie Sara
Dr. Moghadam Mmeni
Dr. Moghadasali Reza
Dr. Moghaddasi Reza
Dr. Moghimi Hamid
Dr. Mohammadi Ali
Dr. Mohammadi Parisa
Dr. Mohammadi Sichani Maryam
Dr. Mohammadipanah Fatemeh
Dr. Mohammadipour Mahshid
Dr. Moharrami Somayeh
Dr. Mojbafan Marziyeh
Dr. Molavi Farahnaz
Dr. Momeni-Moghaddam Madjid
Dr. Momtazi Farzaneh
Dr. Monajemi Ramesh
Dr. Morshedi Dina
Dr. Motiei Marjan
Dr. Mousavi Amir
Dr. Naderi Alamdardehi Reza
Dr. Naderloo Reza
Dr. Nahidian Bahar
Dr. Nasiri Akram
Dr. Nasr Shaghayegh
Dr. Nasrollahi Fatemeh
Dr. Nazarian Shahram
Dr. Oraghi Ardabili Zahra
Dr. Orang Mina
Dr. Parishani Foroushani Mohammad Reza
Dr. Pasalari Hossein
Dr. Patimar Rahman
Dr. Piravar Zeinab
Dr. Pormehr Mohammad

Dr. Pourhosseini Pouneh Sadat
Dr. Rafiee Aras
Dr. Rahimian Hassan
Dr. Rahnama Mehdi
Dr. Rajabi Maham Hassan
Dr. Rajabian Tayebeh
Dr. Ramezani Mina
Dr. Ramezani Sara
Dr. Ranjbar Massoud
Dr. Rezaei Arezou
Dr. Rezaian Maryam
Dr. Rezayof Ameneh
Dr. Riahi Mehrshid
Dr. Rouhi Aminjan Atabak
Dr. Saadatmand Sara
Dr. Saboora Azra
Dr. Sadati Lemardi Seyedeh Narges
Dr. Sadeghi Forouzan
Dr. Sadeghi Mehdi
Dr. Sadeghi Mehdi
Dr. Saeidi Hojjatollah
Dr. Safavi Seyedeh Maliheh
Dr. Sajadimajd Soraya
Dr. Salami Alireza
Dr. Salimian Jafar
Dr. Samari Elahe
Dr. Seiedy Marjan
Dr. Semnanian Saeed
Dr. Shafiee Sabet Saeed
Dr. Shahdadi Adnan
Dr. Shariati Parvin
Dr. Shavnadi Mahmoud
Dr. Siahsarvie Roohollah
Dr. Sisakhtnezhad Sajjad
Dr. Sorahinobar Mona
Dr. Staji Hamid
Dr. Tafrihi Majid
Dr. Talebi Ahmad Farhad
Dr. Talebi Kahdui Ali Asghar
Dr. Talkhabi Mahmood
Dr. Teimourian Shahram
Dr. Vafadar Mahnaz
Dr. Vatankhah Elahe
Dr. Yari Siamak
Dr. Yazdani Mohammadreza
Dr. Yazdanparast Razieh
Dr. Zarabi Mahboubeh
Dr. Zeinalzadeh Tabrizi Hossein

Table of content

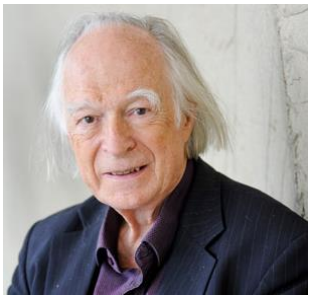
Keynote Speakers

Invited Speakers

Oral Peresentation

Poster Peresentation

KEYNOTE SPEAKERS



Prof. Denis Noble; CBE, PhD, FRS

Emeritus Professor of Cardiovascular Physiology
https:/www.dpag.ox.ac.uk/team/denis-noble

Denis Noble developed the first mathematical model of cardiac cells in 1960 using his discovery, with his supervisor Otto Hutter, of two of the main cardiac potassium ion channels. These discoveries were published in Nature (1960) and The Journal of Physiology (1962). The work was later developed with Dick Tsien, Dario DiFrancesco, Don Hilgemann, Yung Earm, Ten Tusscher & Panfilov, and others to become the canonical models on which more than 100 cardiac cell models are based today. All are available on the CellML website.

More recently he has focussed on developing skeletal muscle models, with articles published in the ground-breaking PHYSIOME journal: formulation of the model and its use in the relief of muscle cramp. More information on this project on https://www.denisnoble.com/systems-biology/

He was elected President of the International Union of Physiological Sciences (IUPS) at its Congress in Kyoto in 2009. He was then elected for a second term at the 2013 Congress in Birmingham, UK. He also delivered the opening plenary lecture at the Congress (see Music of Life link) which is also published as an article in Experimental Physiology (2013). He is the author of the first popular book on Systems Biology, The Music of Life, and his most recent lectures concern the implications for evolutionary biology. To follow the debate on this see the FAQ (Answers) pages on the www.denisnoble.com website.His book, Dance to the Tune of Life. Biological Relativity, extends the systems approach to biology, including evolutionary biology.

KN1 Why does the world need an integrative system approach to biology

Denis Noble -Department of Physiology, Anatomy & Genetics, University of Oxford, Oxford, UK.
E_mail: nobleoxford@gmail.com

It is now 20 years since the first human genome sequence was announced in 2001. The expectation was that, by now, we would have cures for cancer, heart disease, and for most of the major diseases of the organs and systems. We have made *incremental* progress, but nothing like the *major change* that was predicted. WHY? We got genetic causation the *wrong way round*, Genes are *used* by organisms, not the reverse. The organism activates, controls, and modifies its genome. What is the evidence and what are the implications for Biology in the 21st century? Those are the topics of this Lecture. I will then address the question of sustainable development.

Prof. Ali A. Moosavi – Movahedi

Professor of Biophysical Chemistry
UNESCO Chair on Interdisciplinary Research in Diabetes, University of Tehran, Tehran, Iran
Institute of Biochemistry and Biophysics, University of Tehran, Tehran, Iran
https://www.researchgate.net/profile/Ali-Moosavi-Movahedi

Ali A. Moosavi-Movahedi is currently Professor of Biophysical Chemistry in IBB, University of Tehran. Born in Shiraz, Iran, in 1953, graduated from National University of Iran (NUI) with a BSc in Chemistry, 1975, from Eastern Michigan University (EMU), USA, with a MSc in Chemistry (Bioanalytical Chemistry), 1979 and from University of Manchester, UK, with a PhD in Biophysical Chemistry, 1986. His research career has been mostly marked on thermodynamics of protein folding/unfolding. In recognition of his outstanding research in the field of science, he was awarded International Khawrazmi Prize, 1990, National Distinguished Professor, 1997, the first class medal for research, University of Tehran, 2003, National Eminent Character 2003, first rank medal for basic science research in Razi Medical Science National Festival 2005, Elsevier-Scopus International Award for Top Researcher in the Field of Biochemistry, Genetics & Molecular Biology 2007, Avicenna Festival First Rank Award for Top Researcher-2008, Member of Iran Academy of Sciences, 2009 and first rank award and national eminent researcher 2009 is conferred in National Research Festival by Ministry of Science, Research and Technology of Iran, selected as Eminent Professor of University of Tehran 2010, prominent Professor appointed by Iran National Elites Foundation 2012 and Essential Science Indicators (ESI) 1% citation scientist in the field of Biology and Biochemistry, TWAS (The World Academy of Sciences) Fellow 2015, IAS (The Islamic Academy of Sciences) Fellow 2016 . He has supervised PhD and MSc students and guides postdoctoral researchers in the cited area. He is the author of 17 books and numerous research full papers published in mostly international research journals mainly in the area of structural elucidation of protein, enzyme and DNA. He is a member of Biophysical Society (USA), Protein Society (USA), Iranian Chemical Society, Iranian Biochemical Society, and is currently the president of Iran Society of Biophysical Chemistry. He is already the president of National Member Committee of International Council for Science (ICSU) at University of Tehran.

KN2 Wisdom-based Outlook on Biological Sciences

Ali Mosavi-Movahedi -. *UNESCO Chair on Interdisciplinary Research in Diabetes, University of Tehran, Tehran, Iran. Institute of Biochemistry and Biophysics, University of Tehran, Tehran, Iran. E.mail: moosavi@ut.ac.ir*

Today, the planet Earth suffers from the man-made technology and industry and this planet is under pressure and suffers from various diseases.

Since the principles and rules of nature and existence have been made correctly, so It should be bio-modeled the science and technology in order to have a prosperous and comfortable life. Therefore, Biomimetic and Bioinspiration should be emulated and scientific and technology centers should be developed on this basis. Biological phenomena must be discovered through basic and fundamental science and interdisciplinary knowledge. This approach should be disciplined in universities and scientific centers towards bio-modeling of nature, and extended in social life.

To discover biological phenomena, it is necessary to educate the knowledge-man scientists with high potential in basic, biological and interdisciplinary sciences.

Prof. Alastair Summerlee

professor emeritus *biomedical* science
University of Guelph, UOGuelph, Department of Biomedical Sciences
https://www.researchgate.net/profile/Alastair_Summerlee

A passionate humanitarian, dedicated teacher, and internationally renowned researcher, Alastair Summerlee served as president and vice-chancellor of the University of Guelph (2003-14), interim president and vice-chancellor Carleton University (2017-2018) and professor of Biomedical Science (1989-2017). He is currently an adjunct professor in the Sprott Business School at Carleton and a professor emeritus biomedical science at Guelph.

Summerlee spent six years on the board of the World University Service of Canada where he became involved in humanitarian issues in the refugee camps in Kenya. His work to raise funds to support education and women and girls in the campus attracted international investment from the governments of Canada and the United Kingdom and from private individuals. Summerlee is part of the international movement to unite universities worldwide in fighting hunger and poverty known as the PUSH Initiative (President's United to Solve Hunger) and was the International Quality of Life Laureate at the United Nations in 2012.

Summerlee has published numerous scientific articles and book chapters, written about teaching and teaching practice, advocated in the media for better conditions for people in refugee camps and is regularly invited to speak on teaching, research, accountability, fund-raising and sustainable business. His current research focuses on iron deficiency and a simple innovation, known as the Lucky Iron Fish®which has the capacity to alleviate the condition for almost 2 billion people worldwide. He is also serving as a Special Advisor to Carleton on the capital campaign and the interim leader of Education City– an initiative to provide educational innovation in the Ottawa region.

KN3 The imperative to develop a sustainable solution to iron deficiency

Alastair JS Summerlee - *Department of Biomedical Sciences, University of Guelph, Guelph, Canada.*
E-mail: alastair@luckyironfish.com

Prof. Ian Adcock

Professor of Respiratory Cell & Molecular Biology
Faculty of Medicine, National Heart & Lung Institute
https://www.imperial.ac.uk/people/ian.adcockMobasheriwolkenhauer

Ian Adcock graduated from St Thomas' Hospital Medical School in 1987 with a PhD in Molecular Pharmacology. After MRC-funded spells in Edinburgh and at St Georges' Hospital in London he moved in 1990 to the National Heart and Lung Institute to work with Professor Peter J Barnes on the molecular mechanisms of glucocorticoid action in the lung. In 2004 he became Professor of Respiratory Cell & Molecular Biology at Imperial College London. Dr Adcock serves on the Editorial Board of several Journals including the AJRCCM and ERJ, is a former Head of Assembly 5 (Airway Diseases) (2014-2017) within the ERS and on the ERS and ATS Programme Committees. Dr Adcock is a PI and WP Leader in the EU/EFPIA IMI UBIOPRED initiative to determine biomarkers of severe asthma using integrated 'omics and clinical features; PI in the MRC-ABPI COPD MAP initiative; PI in the MRC-Asthma UK Centre for Asthma and Allergy and a PI in the CRF at the Royal Brompton and Harefield Hospitals.

KN4 Immune cell types in severe asthma

Ian M Adcock, Angelica Tsitiou, Nazanin Zounemat Kermani, Yusef Badi & Ying Shi -*National Heart & Lung Institute Imperial College London. E.mail: ian.adcock@imperial.ac.uk*

Asthma is a chronic inflammatory disease of the airway associated with the recruitment and activation of a large number of diverse immune cells including eosinophils, macrophages, mast cells, neutrophils and T cells. These play divergent roles in the various sub-types of asthma that exist and make excellent potential therapeutic targets for specific patients. The advent of single cell sequencing and associated bioinformatics tools has enabled the interrogation of immune cell subtypes in asthma samples that were previously difficult to either access or isolate sufficient immune cells from such as bronchial biopsies, BAL and sputum. The presentation will highlight how distinct we can use information from single cell analysis to identify groups of severe asthmatics associated with key cell-types that are driven by specific driver mechanisms. This has implications for personalised medicine.

Prof. Fatemeh Maghuly

Professor of Plant Functional Genomics
University of Natural Resources and Life Sciences Vienna,Vienna, Austria
https://forschung.boku.ac.at/fis/suchen.person_uebersicht?id_in=5595&menue_id_in=101&sprache_in=en

She holds a habilitation in Plant Functional Genomics at BOKU, Vienna. She is the author and co-author of more than 40 peer-reviewed papers and monographs. She was/is the PI or team member of several national and international projects supported by FWF, FFG, EU. As Principal Investigator, F.M. was responsible for the genetic characterization of an extensive collection of apricot accessions and several hundred transgenic stone fruits and grapevine plants. Since 2005, F.M. joined the allergen research efforts, intending to develop improved detection methods for traces of food allergens in fresh and processed plant-derived products. Since 2009, F.M. was responsible for targeted genotyping of a bioenergy plant (J. curcas), to discover SNPs using TILLING and EcoTILLING approaches, as well as GBS and double digest GBS sequencing (ddGBS). The whole transcriptome of different developmental stages of J. curcas seed was studied using NGS. Technical expertise in population genetics, molecular marker development, and NGS allows her to handle the diverse bioinformatics approaches. She is familiar with all resources, genomics, phenomics, and gene editing (CRISPR/Cas) to study gene function. F.M. has also stayed as a visiting professor at several institutions abroad.

KN5 Multi omics approaches to improve none-domesticated Jatropha curcas: Challenges to counteract land degradation

Fatemeh Maghuly, Ph.D. - *Department of Biotechnology, University of Natural Resources and Life Sciences, BOKU, Vienna, Austria. E-mail: fatemeh.maghuly@boku.ac.at*

With increasing human activities, the most significant challenges are facing energy demand, fuels and CO2 emission from fossil fuel, which resulted in the release of the high amount of greenhouse gases. To solve this problem, it is necessary to design and use more efficient machines, processes and alternative fuels.

In the last years, biofuel crops received more attention in transferring crude fossil oil to more sustainable resources. Among different oil-rich seeds plant, *J. curcas* is considered a promising source of non-edible oil, which can be used for biodiesel production. It is an extremely drought-tolerant plant that can grow in places where other plants fail to be cultivated. Jatropha thrives on almost any soil and can prevent soil erosion and therefore can be considered an effective option for rehabilitating wasteland. It has also been found as a suitable plant for cultivation, not interfering with food crop agricultural production. Its seeds contain 20% to 50% oil and 22to35% proteins, even higher than soybean. Thus, the wish to take this plant into culture has been steadily increasing. However, *Jatropha* has not really been domesticated. Its seeds contain a range of toxins and anti-nutritional compounds, which render the seedcake and oil unsuitable for animal feed and human consumption. Besides, the lack of knowledge of the quantitative genetic variations and gene expression patterns makes it difficult to predict its seeds' oil and toxin levels.

Therefore, optimizing *Jatropha* yield and seed quality to identify key enzymes invoking in the seed maturation process is important. Moreover, in-depth knowledge of the *J. curcas'* genomic approaches needs to be complemented by qualitative and quantitative analyses at several omic levels to obtain functional genomics information, which will accelerate breeding efforts in this biofuel crop.

Prof. Abdolhassan Kazemi

Professor,Senior Lecturer(MSc, MSPH, PhD, Fellowship)
https://www.researchgate.net/profile/Abdolhassan-Kazemi-2

Professor, Senior Lecturer: Dean of Medical Philosophy & History Research Center, Tabriz Uni. of Med. Sci., Iran; Dean of Medical Ethics Research Team, Tabriz Uni. of Med. Sci., Tabriz, Iran; Dean of Bio-Medical Ethics Dept. Tabriz Uni. of Med. Sci. Tabriz , Iran; Dean of Medical Mycology Dept. Tabriz Uni. of Med. Sci., Tabriz, Iran.
Educational records & qualification: Fellowship in Bio-Medical Ethics. Medical Ethics & Law Research Center. Shahid Beheshti Uni. of Med. Sci., Tehran. Iran (2008-2009). Ph.D in Molecular Biology. School of Biological Sciences. The Uni. Of Manchester. Manchester. UK (1999-2002). M.Sc in Molecular Biology. School of Biological Sciences. The Uni. Of Manchester. Manchester. UK (1998-1999). M.S.P.H. in Medical Mycology. Tarbiat Modarres Uni. Faculty of Medical Sciences. Tehran. Iran. (1986-1991).
Administrative experience: Research vice-chancellors, Tabriz University of Medical Sciences (2004-2006); Director of International Relation Affairs, Tabriz University of Medical (2002- 2004); Dean of Medical Mycology Dept., Tabriz University of Medical Sciences (2003-present); Dean of Medical Ethics Research Team - Tabriz Uni. of Med. Sci.(2007-present); Dean of Medical Ethics & History Research Center - Tabriz Uni. of Med. Sci.(2009-present), Dean of Bio-Medical Ethics Dept. - Tabriz Uni. of Med. Sci.(2011 –present).
Award: National Selected Lecturer & Academic Staff (Iranian Ministry of Health, Treatment & Medical Education-2005); National Selected Lecture in Educational Motahhary Award (2009); National Selected Lecture in Educational Motahhary Award (2011)

KN6 Biological supertrends, futures studies and futures perspectives of human society and civilization

Abdolhasan Kazemi - *Medical Philosophy and History Research Center, Tabriz University of Medical Sciences, Tabriz, Iran. E_mail: Kazemi1338@gmail.com*

The subjects like Synthetic biology, Mimic biology, Artificial biology, and Virtual biology actually refer to the realization of "second nature, new nature" or the attempt to recreate nature.

Forms the basic super-framework in the field of life and medicine sciences and with synthetic synthesis or genomic manipulation; A minimal genome called the “Biological chassis” and then the “Cell chassis”; the back cell creates the desired or ideal base for specific defined purposes.

These initial steps (bio-chassis, cellular chassis) eventually lead to the final step, the Homosyber human (Techniqueno species), which is the descendant of Homo sapiens, the product of natural evolutionary processes, natural selection, and evolutionary pressures over species evolution during billions years. Is alive, transforms into a homosyber human being who in his realization and belly; of course, the concept of Trans Humanism follows and also leads to the objectivity of genetic doping, genetic fabrication, trait selection, infant design, and so on. The objectivity of the above concepts, of course, leads to the realization of live machines, which in turn blurs the line between the non-living machine, the robot, and the human free agent, especially since living machines have a Dignity identity and are considered citizens. Therefore, along with human dignity, human dignity is the subject of machine dignity and of course, consequently, the discussion of machine ethics and the values and moral norms related to the interaction of human and human society with the society of living machines with identity and dignity. The combination of the above ideas will lead to a change in the structure and basic concepts related to human civilization, culture, society, education, moral and legal values, the concept of normative and moral virtues and ugliness, idolatry and the perception of human beings as the end of creation. All familiar concepts in the history of civilization will advance human societies, as in the case of non-human species of living organisms, the emergence of chimer species, microorganisms with no history of vacuolar life chain and biological cycles, new equilibrium and unknown areas in biology. One of the most important issues to consider is the manner of communication and interaction without the biological and ecological background of this "secondary nature or new nature" with each other and with the "primary nature" or existing nature, and in the meantime, of course, the possibility or impossibility Symbiosis is a point of contention between these two areas, because the establishment of “Biological apartheid” is not considered a solution to the dilemma of this area.

Keywords: Biological Supernatants, Secondary Nature, Biological Synthetics, Biological Apartheid, Human Dignity

INVITED SPEAKERS

IS1 Pneumolysis in COVID-19: pathophysiology and high altitude implications

Gustavo R. Zubieta-Calleja -*High Altitude Pulmonary and Pathology Institute (HAPPI-IPPA), Av. Copacabana - Prolongación # 55, La Paz, Bolivia. E-mail: gzubietajr@gmail.com; Cel: 591-73258026.*

Severe lung compromise in COVID-19 patients often evolves to life-threatening hypoxemia. The mechanisms involved are not fully understood. Their understanding is crucial to improve the outcomes. Initially, past-experience lead to the implementation of standardized protocols assuming this disease would be the same as SARS-CoV. Impulsive use of ventilators in extreme cases ended up in over 88% fatality. Medical and physiological high altitude acute and chronic hypoxia experience with COVID-19 hypoxemia grants a new insight. A pathophysiological analysis is performed based on literature review and histopathological findings. Application of the Tolerance to Hypoxia formula = Hemoglobin/$PaCO_2$ +3.01 to COVID-19, enlightens the critical hypoxemia. *Pneumolysis* is an acute infectious disease marked by *inoculation of the Coronavirus-2 RNA or other viruses within the pneumocytes, viral* intra-cellular replication and *pneumocyte destruction (*generally not compromising the bronchioles), accompanied by *inflammation, edema,* capillary vasodilatation, the formation of hyaline membranes, and micro-abscesses, nuclear atypia, characterized by non-productive cough, initial silent hypoxemia, and sudden onset of difficulty in breathing, fatigue, tachycardia and rapid progression to a reduced lung gas exchange area and subsequent fibrosis. First known use: Jun 13, 2020. The adequate interpretation of the histopathological lung biopsy photomicrographs reveals these alterations. The three theoretical pathophysiological stages of progressive hypoxemia (silent hypoxemia, gasping, and death zone) are described. At high altitude, normal low oxygen saturation (SpO_2) levels (with intact lung tissue and adequate acid-base status) could be considered *silent hypoxemia*. Several factors influence a lower incidence of COVID-19 at high altitude. At sea level, in COVID-19, the *silent hypoxemia* starting at SpO_2 =< 90% (comparable to a normal SPO_2 {88-92%} at 3,500m) suddenly evolves to critical hypoxemia. This, as a consequence of progressive *pneumolysis* + inflammation + overexpressed immunity + HAPE-type edema resulting in pulmonary shunting. The proposed treatment is based on the improvement of the Tolerance to Hypoxia (Hemoglobin factor), inflammation reduction, antibiotics, rehydration and anticoagulation if required. Understanding the pathophysiology of COVID-19 may assist in this disease's management.

IS2 Applying behavioral insights to control COVID-19 epidemic in I.R. of Iran

Seyed Abbas Motevalian -*Professor of Epidemiology, Iran University of Medical Sciences . E-mail: amotevalian@iums.ac.ir*

The trend of epidemic changes in COVID-19 is influenced by the trend of changes in people's behavior. Understanding the process and planning properly to control the epidemic requires correct and accurate information about people's behaviors and the trend of its changes. In the COVID-19 Population Survey of Iran (COPSIR study), the trend of changes in the behavior of the Iranian adults in relation to COVID-19 has been examined. Serial cross-sectional studies in 9 consecutive waves with telephone interviews have been carried out on Iranian adults aged 18 years or older. The survey instrument is adapted from German COSMO (COVID-19 Snapshot MOnitoring) study. In each wave, 515 individuals and 4605 in total participated in the study. Knowledge about COVID-19 symptoms, routes of transmission, and its preventive measures among Iranian adults was high and stable in all nine waves of the study, with little increase in knowledge about the symptoms. Risk perception and severity perception of Iranians was generally lower than expected, with a little increase in waves 7 to 9 (July 2020 to February 2021). Preventive behaviors were high and constant in the first four waves (April to May 2020) with a decrease in 5^{th} to 7^{th} waves (May to July 2020). The most trusted and mostly used media for receiving COVID-19 related information was national television channels. Low perceived risk caused people to downplay the risk of COVID-19. So, by easing social restrictions, Iranians quickly put aside their preventive behaviors which led to the second and third waves of COVID-19 epidemic in Iran. Risk communication strategies and public health measures must be strictly followed to prevent the fourth wave or reduce its severity.

IS3 Emission, effects and mitigation of greenhouse gases (GHGs) in agriculture

Muhammad Arshad Javed - *Professor at University of the Punjab, Lahore, Pakistan. E-mail: majaved.iags@pu.edu.pk*

The main sources of Green House Gases (GHGs) emission are burning of fossil fuels (for industrial use, transportation, electricity etc.), clearing the land to produce wood (domestic, industrial, or crop husbandry etc.), industrial developments, energy sector and agriculture. *Carbon dioxide*, *methane*, *nitrous oxide*, *ozone* and Chlorofluorocarbons (CFCs) are the primary GHGs in our atmosphere. GHGs absorb and emit the solar radiations within thermal infrared range which is the basic cause of greenhouse effects. It is reported that since pre industrial, there is an increase of 31%, 151% and 17% in CO_2, CH_4 and N_2O, respectively.

Land clearing for crop husbandry is responsible for high CO_2 in atmosphere. Land clearing disturbs the soil and increases the organic matter decomposition which results in release of high quantity of CO_2. It enhances the soil erosion which limits the soil's ability to uptake carbon. Crop husbandry includes the slash and burning the residues which further add up CO_2 in the atmosphere. Methane (CH_4) is produced as by product in several agricultural activities. Rice culture, livestock and termite mounds are the main sources of methane emission while biomass burning also contributes significantly. Standing water with a lot of organic water creates anaerobic conditions where anaerobic bacteria utilize CO_2 as source of O_2 and release huge amount of methane. In traditional rice culture, rice crop is submerged for four months a year. This practice adds 50-100 million tons of methane in atmosphere and reported to be the largest anthropogenic source of methane. Termite mounds are a significant methane release process in tropics due to abundant plant residues. The bacterial activity in the animal's stomach and intestine (particularly the cows and buffalos) is another source of methane emission (about 100 million tonnes per year) to atmosphere. Further the decomposition of livestock wastes is another significant source of methane emission. N_2O is the third important GHG released by agriculture. Bacteria in low/zero-oxygen environments convert nitrite (NO_3) to nitrogen gas (N_2) and nitrous oxide (N_2O) under anaerobic conditions. Inorganic fertilizers and animal manure are the main source of N_2O release in the soil.

Among the cereals, rice is the main staple food more than half of world population, mainly in Asia and Africa. To feed 9 billion world population, 25 % increase in rice yield is required in 2050. Tropics contribute 75 % of world rice production. The effects of climate change are expected to be more severe in tropics. Intergovernmental Panel on Climate Change (IPCC) reported an increase in global temperature (0.6 °C) during last century and predicted a further increase about 5 °C during this century. This climate change will affect the rice productivity severely due to sensitivity of critical stages of rice crop. The optimum temperatures for germination, tillering, pollination and ripening are 18-40 °C, 25-31 °C, 30-33°Cand 20-29 °C, respectively. The current temperatures are already approaching critical levels in different countries e.g. Pakistan/ India (September, October), South India (April, August), East India/Bangladesh (March–June) in subcontinent. Several researchers reported negative effects at different growth stages which resulted poor rice productivity due to low germination, poor tillering, high panicle sterility etc. Water shortage, increased soil salinity, flooding, increased risk of disease infestation and pest attack and enhanced rice-weed competition are the others outcomes of climate change. These factors will affect the rice productivity severely. To face the future challenges in rice productivity, development of tolerant varieties to environmental stresses (temperature, salinity, lodging, and drought) and biotic stresses (disease and insect-pest resistance) is only option either through hybridization or genetic transformation. Climate smart agriculture (CSA) is an integrated approach to manage landscapes, croplands, livestock, forests, and fisheries that address the interlink challenges of food security and climate change with aim to achieve simultaneously achieve three outcomes; increased productivity, enhanced resilience and reduced emissions. Emission of methane may be reduced by keep low numbers of animals with high productivity of milk and meat, establishment of rangelands for grazing, generation of biogas and biofertilizer form the animal wastes. Similarly, dry rice culture may be adopted by introducing the climate resilient varieties with tolerance to biotic and abiotic stresses. The nitric oxide emission may be reduced by intruding the organic fertilizers, optimum dose and right time for application of chemical fertilizers, increasing the soil organic matter, use of slow-release fertilizers. However, CO_2 may be managed by AGRO FORESTORY, encouraging the home gardening, rooftop gardening, urban farming etc. Last but foremost, a comprehensive awareness campaign may be initiated worldwide to raise such a generation who can be CLIMATE GUARDIANS, as mindset and attitudes would be the key elements in mitigation process.

IS4 Characterization of the complete chloroplast genome sequence of the IRLC species and its phylogenetic implications

Shahrokh Kazempour Osaloo & Mahtab Moghaddam -*Department of Plant Biology, Faculty of Biological Sciences, Tarbiat Modares University, Tehran 14115-154. E-mail: skosaloo@gmail.com*

Fabaceae (legumes) are the third largest family of angiosperms which have shown the most structural variation. Currently accepted classification of the legumes based on plastid gene *mat*K includes six subfamilies: Caesalpinioideae, Cercidoideae, Detarioideae, Dialioideae, Duparquetioideae, and Papilionoideae. Gene order and gene content in plastomes of all subfamilies except Papilionoideae are highly conserved and similar to the ancestral angiosperm genome organization. Papilionoideae exhibit numerous rearrangements and gene/intron losses and have smaller genome. The remarkable loss of the one of the plastid inverted repeats in the inverted repeat lacking clade (IRLC), a largest legume lineage, is an example of genome variation in papilionoids. This clade comprises 52 genera (e.g., *Wisteria*, *Glycyrrhiza*, *Astragalus, Colutea, Trifolium, Lathyrus, ...*) and ca 4000 species divided into eight tribes. Furthermore, plastome in IRLC show other rearrangements of gene order and gene content. For example, *ycf*4 in some species of *Lathyrus* and *Pisum* (both from the tribe Fabeae) is either absent or a pseudogene. Comparative analysis of the chloroplast genomes across the IRLC revealed that *ycf*1 gene, which is located in the IR region, is more variable than *mat*K in many taxa and thus suitable for molecular systematics at low taxonomic levels. Furthermore, the monophyly of the IRLC and all its tribes is in accordance with all previous studies.

IS5 DNA Barcoding: An Effective Molecular Tool to Identify Gene Expression Host Organisms

Elham Taghipour[1], Fateme Frootan[1]*, Ali Hatef Salmanian[1], Jafar Amani[2] -*National Institute of Genetic Engineering & Biotechnology (NIGEB), Department of Plant Biotechnology, Tehran, Iran, [2]Applied Microbiology Research Center, Baqiyatallh University of Medical Sciences, Tehran, Iran. E-mail: f_frootan@nigeb.ac.ir*

Lemnaceae family members (commonly called as duckweed) are characterized as the world's smallest and fastest growing flowering plants. It consists of monocotyledonous aquatic members, representing a vast range of potential applications like production of feed and food, biofuel and biogas alongside the molecular biotechnology, because of possessing a noteworthy capacity of huge biomass production. The first stage of all of the above-mentioned approaches is to obtain the appropriate species selected based on suitable strategies. Since a high degree of reduction in their anatomical complexity and minimalization of the morphological units make it hard to identify the closely related species of duckweeds based on morphological markers, different molecular taxonomic tools are introduced to require a solution of the problem. DNA barcoding is one the molecular taxonomy techniques using sequences of plastidic DNA fragments. Till now, there is no evidence on molecular identification of the Iranian native duckweed species based on sequence polymorphisms. In this study, we collected some Iranian samples and applied divergent marker categories such as non-coding spacers to achieve reliable successful identification based on direct sequence comparison. Our final goal in this project is to present identified optimal and sustainable strains of the duckweed with acceptable relative growth rate and doubling time in which recombinant pharmaceuticals can expressed in additional related studies.

IS6 The fate of silver nanoparticles in *Lycopersicon esculentu*

Azam Noori, Ph.D. -*Department of Biology, Merrimack College, North Andover, MAUSA. E-mail: nooria@merrimack.edu*

The advancement of nanotechnology has resulted in the application of nanomaterials in a diverse area including medicine, industry, or agriculture. The vast application of nanomaterials and their potential release into the environment can affect soil and water quality, plants, and subsequently human health through the food chain. Silver nanoparticles (AgNPs) are among the most commonly used nanomaterials. AgNPs released into the environment can be oxidized and be transformed into the ionic form (Ag^+) which is more interactive than the particulate form. This study investigated the molecular and physiological responses in tomatoes (Lycopersicon esculentum) exposed to 30 mg/L AgNPs (20nm) for seven days. Plants exposed to $AgNO_3$ and Hoagland media were subsequently used as positive and negative controls. To determine the concentration of Ag and to distinguish between the particulate and the ionic form of Ag in plant tissues an ICP-MS (NEXION

350X) equipped with a nano-detector was used. The concentration of H_2O_2 and MDA, as well as the activity of antioxidative enzymes catalase and peroxidase, were investigated to determine the level of oxidative stress in plants. The expression of membrane transporters H^+-ATPase and V-ATPase as well as the expression of enzymes catalase and mitochondrial IDH were studied using RT-q-PCR. Immunofluorescent labeling was used to study the expression of proteins. The analytical analysis showed that both particulate and ionic forms of silver were accumulated in plant tissues confirming that AgNPs can be oxidized in the environment. The physiological analysis showed that the oxidative stress caused by Ag^+ was more significant than the particulate form. The expression of H^+-ATPase was significantly upregulated upon exposure to AgNPs and $AgNO_3$ compared to the control group. This study suggests that the higher concentration of Ag^+ in plants exposed to all forms of silver changed the electrochemical potential of cells and resulted in the upregulation of H^+-ATPase to send more H^+ out of cells. This study provides invaluable information to better understand the fate of metal-based nanomaterials and their effects on plants.

Keywords: Analytical analysis, Membrane transporters, Nanoparticles, Oxidative stress

IS7 Plant life on gypsum: living at the edge

Sara Palacio -*Cajal researcher at the Instituto Pirenaico de Ecologia (CSIC, Spain).E-mail: s.palacio@ipe.csic.es*

The occurrence of special substrates such as saline, serpentine, dolomite or gypsum soils, with a distinct flora associated to them, has puzzled naturalists for centuries. Some of these substrates, and the adaptations displayed by plants to cope with them, are quite well understood. Such is, for example, the case of saline and serpentine soils, where distinct traits have been identified as characteristic of plants adapted to them. However, other substrates like gypsum soils are still poorly understood, and the mechanisms displayed by plants to survive on them pose intriguing questions to ecologists. Gypsum ($CaSO_4 \cdot 2H_2O$) is a rock-forming mineral that also occurs in soils. Gypsum outcrops are widespread throughout the Earth, being present in the five continents. They are particularly prevalent in arid and semi-arid regions of Africa, Western and Central Asia, where they account for ca. 40%, 75% and 25% of the total surface, respectively. Gypsum is also a key water-holding mineral of Mars, and a targeted substrate in the search of extra-planetary life. Due to its particular physical and chemical properties and the aridity typical of the areas where gypsum soils develop, this type of soil poses very restrictive conditions to plant life, yet it hosts a highly diversified flora, rich in endemic and rare species. This talk is an invitation to discover the most recent advances on the ecology and evolution of gypsum plants throughout the world. We will take a closer look at the diversity of gypsum plant communities, examine the different limitations that restrict plant growth on gypsum soils, explore the various mechanisms displayed by plants to cope with them and analyze the dangers that threaten the conservation of these unique environments.

IS8 Using Protected Areas to Secure Forest Tree Genetic Diversity in Hyrcanian forest (Application to the endemic and endangered *Populus caspica*

Shirin Alipour[1], Hamed Yousefzadeh[2]*, Ziaedin Badehian[1], Farhad Asadi[3], Kambiz Espahbodi[3], Łukasz Walas[4], Monika Dering[4,5]* -*1. Department of Forestry, Faculty of Agriculture and Natural Resources, Lorestan University, 8 Khorramabad, Iran; alipour.sh@fa.lu.ac.ir (S. A); badehian.z@lu.ac.ir (Z. B) 2. Department of Environmental Science, Faculty of Natural Resources and Marine Science, 10 Tarbiat Modares University, P. O. Box 14115-116, Noor, Iran; h.yousefzadeh@modares.ac.ir 3. Natural resources Research Department, Mazandaran Agricultural and Natural Resources 12 Research and Education Center, AREEO, Sari, Iran; fasadi@rifr-ac.ir (F. A); 13 k.espahbodi@areeo.ac.ir (K. E) 4. Institute of Dendrology, Polish Academy of Sciences, Parkowa, Kórnik,Poland;lukaswalas@man.poznan.pl, mdering@man.poznan.pl 17.5Faculty of 15 Forestry, Poznań University of Life Sciences, Wojska Polskiego, Poznań, Poland; mdering@man.poznan.pl 17. E-mail: h.yousefzadeh@modares.ac.ir; mdering@man.poznan.pl*

The planning of the protected areas and their effectiveness in maintaining the genetic diversity of species remain challenging. The severe degradation and anthropogenic activities in plain regions of the Hyrcanian forest and designing several national parks that have been proceeding for at least three decades provide an opportunity to assess the role of protected areas in conserving genetic diversity. *Populus caspica* Bornm. is an endemic species from Hyrcanian forests and classified as endangered in Iran. For this study, 359 trees from 20 populations (including three national parks from eastern, central, and western parts) distributed throughout the plain region of the Hyrcanian forest, were selected to evaluate the genetic diversity parameters using 14 microsatellite markers. The highest allelic richness, private alleles, and gene diversity were observed in populations located

within national parks, i.e. Ashrafieh, Noor and Loove. Significant reduction in effective population size and a genetic bottleneck were not observed in popualtions in national parks, while about 50 percent of other populations (8 from 17) are under bottleneck effect. STRUCTURE analysis showed the existence of at least two genetic clusters with strict geograohic background but estimated average gene flow was low - the average proportion of the migrants detected among populations was 0.008. We concluded that designing a protected area for the maintenance of the genetic diversity of *Populus caspica* is a very good strategy to reduce the risk of the extinction of this species in the near future.

Keywords: Caspian poplar, endemic species, Genetic conservation, Protected area, Hyrcanian forests.

IS9 Molecular Biophysics of SARS-CoV-2 virus and its susesepibiliy

Hamid Mobasheri- *Professor of Biophysics, Institute of Biochemistry and Biophysics, University of Tehran, Tehran, Iran.*
E-mail: h.mobasheri@ut.ac.ir

SARS-CoV-2 corona virus that caused the Covid-19 Pandemic, is composed of the lipid bilayer membrane and several constituent antigenic proteins including; Spike, Orf3a, and other envelope (E) proteins that can be used as potential targets for treating the virus in a non-clinical and genetically manner. The known atomic structure of the mentioned molecules at atomic level has made it possible to take biophysical approaches focusing on the charges, intra and intermolecular electrostatic interaction and forces, as well as their physico-chemical interactions with the medium co-ions and counter-ions, pH, temperature and water status as the neutralizing, destructing and treating agents. Furthermore, due to the atomic and molecular characteristics and configuration of virus, it can be considered likewise solid state materials and expect to affect its electrical status by exposing it to external electrical, magnetic and elecromagnetic fields for the detection and inactivation purposes. The conformation of the spike protein and its functional antigenic status is achieved and stabilized by intra-molecular and inter-molecular forces that are susceptible to the external fields. Here, the ultrastructure of the virus will be discussed and different approaches considered to study and treat its membrane and constituent proteins for detection and inactivation purposes are presented. Our voltage clamp experiments have shown EMF effect on the lipid membrane integrity and voltage-dependent channel activities leading to pore formation and ultimate destruction of the membrane. Furthermore, the applied EMF caused decreased voltage sensitivity and long lasting inactivation of the voltage dependent OmpF voltage gated channel. Accordingly, although, the actual contribution of the voltage-gated rectifier OrfA channel is not fully known yet, we expect that exposing it to the external EMF can interfere with its activity and possible deviation of the virus functionality and ingrity and corresponding response be used for detection purposes.

Keywords: Biophysics, SARS-CoV-2, Covid-19, EMF, Membrane, Voltage Clamp, Virus.

IS10 Role of HMGB1 and decorin in preeclampsia

Alam Iqbal - *Department of Physiology,Hamdard Institute of Medical Sciences & Research,Jamia Hamdard, Hamdard Nagar,*
E-mail:ialam@jamiahamdard.ac.in

Preeclampsia (PE) is a common, pregnancy-specific disease that belongs to the family of “hypertensive disorders in pregnancy” and is characterized by hypertension, proteinuria and other systemic disturbances at or after 20 weeks of gestation. PE is a major contributor to maternal and fetal morbidity and mortality. Eventhough the precise mechanisms of PE pathogenesis remains unknown, it is widely acknowledged that the placenta is the central organ in its pathogenesis, and PE is caused by maternal responses to abnormal placentation and associated with an increased inflammatory state. Pre-eclampsia is closely related to maternal malfunction of the vasculature and is a major cardiovascular risk for the duration of the pregnancy, post-parturition and in later life. Also, endothelial dysfunction may contribute to elevate the peripheral resistance of blood vessels, which forms an essential component of the maternal syndrome. This study is aimed at the study of sterile immunomodulatory profile of normal-pregnant versus pre-eclamptic subjects and focuses on the identification of potential biomarkers for the early detection of PE and the changes in the hemodynamic parameters leading to the pathophysiology of PE. There have been a lack in the proper understanding of the pathophysiology of PE & hence, no effective therapy or treatment is available so far. The levels of NO were significantly decreased in PE as compared to healthy pregnant subjects. As NO is a potent vasodilator, when its level in circulation

decreases, the contraction of blood vessels increases which leads to elevation in the blood pressure. In our study, we observed that there is a marked increase in the expression level of SI markers (DAMPs) such as HMGB1, HSP90, vWF and DCN in plasma as well as in the placental tissue. From these observations, we can conclude that these inflammatory markers play an important role in the commencement of the pathophysiology of PE. We observed a decreasing trend in all SI markers when the pre and post-delivery samples of PE patients were compared, however significant reduction was seen only in the case of DCN for the SI markers. Therefore, it can be deduced that the DCN is one of the most important molecules which plays a significant role in the pathophysiology as well as progression of PE. On comparing the biochemical reports of the PE and normal subjects we have found that there is statistically significant increase in the biochemical parameters of the patients versus normal subjects. We observed that certain biochemical parameters such as S. Alkaline phosphate, SGOT, SGPT and protein concentration were significantly increased in PE as compared to healthy controls while no significant change was observed in blood urea and serum creatinine levels. We also analysed the blood parameters from the CBC (complete blood count) reports of patients. On comparing both the reports we observed that the NLR (neutrophil to lymphocyte ratio) was significantly increased in PE as compared to healthy pregnant subjects. On combining all the observations, we can conclude that low levels of NO lead to placental hypoxia which induces DAMPs expression. Increased expression of DAMPs in turn acts as a stimulus for neutrophil activation in increasing the NLR in PE patients

IS11 Oxygen sensing and Lead (Pb) toxicities: Molecular interactions, cell signaling & antioxidant defense

Kusal K. Das -*Laboratory of Vascular Physiology & Medicine, Department of Physiology,Shri B.M.Patil Medical College, Hospital and Research Centre, BLDE (Deemed to be University), Vijayapur – 586103, Karnataka, India. E-mail: kusaldas@bldedu.ac.in*

Hypoxia is one of the most serious factors that can directly impair the function of metabolic pathways in the cell. Cellular hypoxia causes an initiation of hypoxia-response genes responsible for angiogenesis, oxygen transport, and metabolism. Hypoxia leads to alter intracellular chemical microenvironment by increasing calcium concentration ([Ca2+]i), 5-lipoxygenase, lipid peroxidation, cycloxygenase (COX), constitutive nitric oxide synthase (cNOS), leukotriene B4 (LTB4), prostaglandin E2 (PGE2), interlukins, tumor necrosis factor-α (TNF- α), caspases, complement activation heat shock protein 70 kDa (HSP-70), and hypoxia-inducible factor-1α (HIF-1α). Another key molecule within this hypoxia-induced response is the presence of nitric oxide (NO). It is synthesized by nitric oxide synthases (NOS) and its release can be stimulated as a result of inflammatory responses, sympathetic activation and drop in oxygen levels. Interestingly hypoxia and divalent heavy metal like lead (Pb) generates ROS and disturbed oxidant/antioxidant balance which is linked to the transcriptional factor hif- 1α. The results from the author's study showed both divalent cationic heavy metal (Pb) or chronic sustained hypoxia stimulates the production of hif-1α transcription factor and VEGF gene expression in metabolically active tissues in similar molecular mechanism.

IS12 Proteomic dissection of signaling pathways in cancer cells

Robert Ewing -*Institute for Life Sciences, University of Southampton, Southampton, Oncogene Biology. E-mail: rob.ewing@soton.ac.uk*

Protein interaction networks underlie most cellular processes, and in many diseases, including many cancers, protein networks that mediate signal transduction pathways are inappropriately activated or rewired. We are interested in how mutations alter protein interaction networks, and we are focused on understanding the role of the Wnt signaling pathway in solid tumors using both proteomic and bioinformatics techniques. In this presentation, I will describe our contributions to developing proteomic and bioinformatics approaches as well as our identification of novel protein-protein interactions that drive oncogenesis.

IS13 Integrated Biorefineries

Mehrdad Azin -*Department of Biotechnology, Iranian Research Organization for Science and Technology, Tehran, Iran. E-mail: azin@irost.ir*

Biorefineries are industrial plants, which are based on the use of biomass, instead of fossil fuels, for production of fuels, chemical base materials and energy. These are comparable with petrochemical refineries in many aspects of their operations and products. It is said that the era of the fossil fuels is at its end, not because of its ending resources, but because of finding new technologies that are more environmentally friendly and economic. Biorefineries are not yet fully operational but are in the midway. Many exhibition pilot-plants are made and working, while a lot of experimental tests are yet on the way. The carbon is the essential material for production of the organic substances and products. We have an enormous source of carbon in the biosphere in the form of CO_2 of the atmosphere and carbonates of the earth crust. Both of these sources are continuously adsorbed by plants, algae and autotrophic microorganisms by the use of solar energy. The biomass of these organisms has an amount of carbon around 50% percent of its weight. This carbon can be converted into a wide spectrum of useful products like biofuels, bioplastics, organic acids, solvents, etc. Different processes are used for these conversions: physical, chemical and biological. Biological processes are more advanced and produce less environmental problems. The diverse metabolic power of microorganisms is used here to produce the products. Nearly, all of the routine refinery's products can be produced by the biorefineries. In this lecture specifications of the biorefineries and some examples of working ones in the world and Iran will be presented.

IS14 Antimicrobial resistance (AMR) and Role of the laboratory in AMR control

Mohammad Mehdi Feizabadi- *Department of Microbiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran. E-mail: mfeizabadi@tums.ac.ir*

IS15 Survey of Microorganisms' World in Kerman Desert

Parisa Mohammadi *[1*]-1. Associate Professor, Department of Microbiology, Faculty of Biological Sciences, Alzahra University. E-mail: p.mohammadi@alzahra.ac.ir*

Microorganisms have a crucial role in soil processes. Information about soil microbiota in arid and semiarid area, especially in Iran is limited. The aim of study was to determine microbial diversity of soil biological crusts (SBC) of Khabr and Ruchun National Park. First, microorganisms of SBC were identified through culture-dependent and culture-independent techniques. Then, microbial diversity was tested by Next Generation Sequencing (NGS) technique. After that, nitrogenase activity of the isolated Cyanobacteria strains was determined *via* acetylene reduction and expression of *nif*H gene by using real time-PCR. Next, desiccation stress was performed on the isolated Cyanobacteria and the superior strain was selected. Whole genome of the tolerance strain of Cyanobacteria to the desiccation stress was sequenced. Afterward, its transcriptional response to the desiccation stress was assayed. Finally, by lab modelling of the desert soil inoculated with the selected Cyanobacteria concerning to the nitrogen fixation, the growth of model plant was evaluated. The results indicated that this area has vast diversity of different phylum of microorganisms. Furthermore, changes in the composition of microbial communities due to the climate fluctuations or other stresses can be shown before any changes in chemical and biochemical properties of soil. The soil treated with Cyanobacteria especially when accompanied with chemical fertilizer showed well increasing of model plant growth and improving soil properties as well. The comparative genome analysis showed the presence of genes involved in the biosynthesis of mycosporines, trehalose and phycobilisome. Transcriptomics and comparative genome analysis showed that 397 genes such as genes encoding catalase and chaperons were differentially expressed in response to the desiccation stress. Transcriptomics and comparative genomic studies can open a new window to the adaptation mechanisms of cyanobacteria studies in terrestrial ecosystems.

Keywords: Cyanobacteria, Acetylene Reduction, Real Time-PCR, Nitrogenase Activity, *nif*H, Khabr and Ruchun Park

IS16 The resulting experience of wildlife management and biodiversity conservation to maintain quality habitat in Semnan province

Amir Abdoos – *E-mail: amir_doe@yahoo.com*

According to the Koppen-Geiger climate classification, the world is divided into five major climatic regions. Iran's biodiversity is the result of the aggregation of three of these five climatic zones. Dry, temperate and continental climates. The result of this climatic diversity is 197 species of mammals, 535 species of birds, 227 species of reptiles, 21 species of amphibians and 160 species of fishes. Thirteenth century Hijri was a century of rapid development and extensive land use, especially in the plains of Iran. Contrary to the explosive growth of hunting equipment and prolonged droughts, this phenomenon has pushed large populations of the country's biodiversity to the brink of extinction. Semnan province is the only province in the country that has all three major climatic regions of Iran. For this reason, the fate of many animal species, especially in the category of mammals, is tied to the habitats of this province. The Asian cheetah is the rarest cat species in the world. It is the flagship species, the umbrella species, the flag species and the focal species of Iran. Unfortunately, the evidence shows that during these twenty years, the reproduction of the Asian cheetah to the protected area of Turan in Semnan province in other habitats of the world and six of the seven provinces of Iran has been lost and the hope for the return of this species to those habitats is very low. The Asian cheetah is now at the top of the ecological pyramid of Iranian steppe animals, and the removal of such blows will inflict severe blows on the body of this pyramid. Therefore, any effort that leads to the conservation of the remaining population of this species will play an effective role in the population dynamics of other species in the food chain ecosystem. This presentation demonstrates the successful results of the efforts made by the General Department of Environmental Protection of Semnan Province, which has led to the conservation of Asian cheetah regeneration and thus the conservation of other species of the ecological pyramid in three areas and its experiences for use in other habitats. Iran and the world consider it usable.

IS17 Regulatory mechanisms of sperm motility initiation in fishes – a review

Sayyed Mohammad Hadi Alavi*- *School of Biology, College of Science, University of Tehran, Tehran, P. O. Box: 14155-6655, Iran*
E-mail: hadi.alavi@ut.ac.ir

Fish spermatozoon is differentiated into a head, a midpiece and a flagellum. The head does not have the acrosome, and contains nucleus which transferring haploid set of the chromosome into the next generation. Mitochondria, proximal centriole and distal centriole are located in the midpiece. Mitochondria supply energy for the flagellar beating. Both proximal and distal centrioles consist of nine peripheral triplets of microtubules. The distal centriole organizes formation of *the sperm motility apparatus called "axoneme" with "9+2" microtubules structure. Fish spermatozoa are immotile in the sperm duct due to osmolality or presence of high potassium (K^+) ions in the seminal plasma. Spermatozoa motility is triggered in* hypo-osmotic and hyper-osmotic environments in freshwater and marine fishes, respectively. Duration of spermatozoa motility is generally limited to a short period due to adenosine triphosphate (ATP) content. After initiation of motility, percentage of motile spermatozoa, spermatozoa velocity and beating frequency of the flagellum decrease due to rapid depletion of ATP stores. *When motility of spermatozoa activated by a change in the environmental osmolality,* K^+ and water effluxes occur in freshwater and marine fishes, respectively, which trigger spermatozoa motility signaling. Generally, initiation of axonemal beating is associated with an increase in intracellular calcium (Ca^{2+}) ions and pH in spermatozoa of both freshwater and marine fishes, while cyclic adenosine monophosphate (cAMP) remains unchanged. However, it has been shown that axonemal beating is cAMP-dependent in demembranated spermatozoa of salmonid and sturgeon fishes. Extracellular or intracellular stores of Ca^{2+} supplies required Ca^{2+} concentration for axonemal beating. Several axonemal proteins have been so far identified that are activated by Ca^{2+} and cAMP, directly or mediated by protein kinase C and protein kinase A, respectively. The present study reviews differences and similarities in complex regulatory signals controlling spermatozoa motility initiation in fishes, and notes physiological mechanisms that await elucidation.

Keywords: ATP, Axoneme, cAMP, Ions, pH, Osmolality, Seminal plasma

IS18 Making Meaningful Decisions for Life: Epigenetic Monoallelic Gene Expression in Mammals

Ali Farazmand -*University of Tehran, Tehran, Iran. E-mail: afarazmand@ut.ac.ir*

Monoallelic gene expression or allelic exclusion, once known to be restricted to random X chromosome inactivation in female mammals, seems to be more common than thought with crucial effects in embryonic development, apparently as a way to increase the repertoire of variations in gene expression patterns. Monoallelic expression of immunoglubin genes and T-cell receptors is responsible for huge diversity of antibody production and antigen recognition, respectively, through DNA rearrangements. However, other patterns of monoallecic gene expression all come in effect via epigenetic mechanisms employ on similar genetic backgrounds. Among these phenomena, *mammalian X chromosome inactivation* in female tissues and the parent-specific *genomic imprinting* considered as classic paradigms for epigenetic gene regulation. While X chromosome inactivation occurs via "*random choice*", however, genomic imprinting exhibits a *deterministic choice* for the expression/repression of the respective genes through a parent- of- origin specific pattern during gametogenesis. Interestingly, X chromosome inactivation shows both patterns of random choice in mammalian somatic tissues, the paternally imprinted form of X chromosome inactivation occurs in marsupials, and also in rodents and human placentas. The last category encompasses stochastic allelic exclusion of a plethora of different autosomal genes, including genes for odor sensing in olfactory sensory neurons, as it seems the rule of one neuron-one receptor gene is essential for odor perception. All kind of epigenetic monollelic gene expression share similar epigenetic signatures, including the expression of long noncoding RNAs, DNA methylation and extensive chromatin modifications, polycomb protein bindings, etc. Also, their organization along the genome and mechanisms involved show considerable parallels. In current lecture, along with a brief introduction of various instances of epigenetic allelic exclusion, its various roles in growth and development of embryos and its some evolutionary implications are discussed.

Keywords: Allelic exclusion, Monoallelic gene expression, X-chromosome inactivation, Genomic imprinting, olfactory receptor genes

IS19 Consequences of Simulated Microgravity in Biosystems: Structural Effects and Cellular morphology

Azadeh Hekmat[1*] *-1. Department of Biology, Science and Research Branch, Islamic Azad University, Tehran, Iran.E-mail: hekmat@ut.ac.ir*

Enhancements in technology have offered extraordinary opportunities for the human to travel more rapidly on or near the surface of the Earth. The primary goals of space travel are the search for life, planetary exploration, and more significantly safe return to Earth. Humans on Earth are adapted to the constant gravitational force (9.8 m/S2). Nevertheless, in space, gravity is much weaker than on Earth which is known as microgravity. Presently, investigations on the growth and development of cells as well as bio-macromolecules structure exposed to microgravity, as biophysical force, is a hot topic in cell biology and astronauts' health. Consequently, we first investigate the probable impacts of simulated microgravity on the structure of human serum albumin (HAS), histone H3, and DNA by multiple spectroscopic techniques. Subsequently, we analyzed the effects of simulated microgravity on the growth of MCF7 and T47D breast cancer cell lines. Our results exposed that the structure of HAS, histone H3, and DNA subjected to simulated microgravity changed significantly. Furthermore, our results showed that microgravity simulation did not have a remarkable effect on the viability of cells, but cells were grouped and linked to each other making multicellular spheroids. The findings achieved from this investigation can open fascinating research lines in biophysics, astrobiology, and biology and can be utilized to enhance survivability and life quality for space travelers.

Keywords: Astrobiology, Cell viability assay, DNA structure, Protein structure, Microgravity

IS20 Bone Tissue Engineering; Advances and Challenges

Behnaz Bakhshandeh – *Department of Biotechnology, College of Science, University of Tehran, Tehran, Iran*.
E-mail:b.bakhshandeh@ut.ac.ir

Tissue engineering is a multifaceted, interdisciplinary discipline that uses the principles of engineering sciences and natural sciences to repair the structurally and functionally damaged tissues. In order to achieve satisfactory results in tissue engineering, simulation of the natural extracellular environment is essential. To achieve this goal, the development of appropriate cell differentiation protocols as well as scaffold design similar to the

natural matrix should be carefully considered. Stem cell differentiation into the bone line is enhanced by many inducers, including biochemical agents, biomechanical stresses, and electrical stimuli. Based on our studies, the synergistic effects of anti-mir221, hydroxyapatite nanoparticles and electrical induction in improving the bone differentiation of mesenchymal stem cells in vivo have been confirmed. Considering the functions and positions of markers in ossification signaling pathways, it can be concluded that hydroxyapatite cooperates in allocating stem cells to bony progenitors in the early stages of ossification while electrical stimulation to more mature cells in achieves functional phenotypes. In general, the study of synergies between different stimuli and the exploitation of interactions in an optimal way can lead to the production of efficient ossification protocols for bone tissue reconstruction and engineering.

Keywords: osteogenic differentiation, electrical stimulation, anti-mir221, hydroxyapatite nanoparticles, regenerative medicine

IS21 The importance of Bioinformatics and Computational Biology in Systems Biology

Changiz Eslahchi -*Department of Computer and Data Sciences, Faculty of Mathematical Sciences, Shahid Beheshti University, Tehran, Iran. E-mail: ch-eslahchi@sbu.ac.ir*

Nowadays, a huge amount of data such as multi-omics data including gene expression, DNA sequences, and demographic information are available that need analysis in order to find latent patterns that give rise to solving biological issues. To this aim, state-of-the-arts approaches such as modeling using graph, machine learning, and deep learning can help to find novel methods for modeling biological systems. Some hot topics in this field are drug-drug interaction prediction, precision medicine, and cancer biomarker detection that can be solved by using the mentioned computational strategies. In this lecture, we going to briefly discuss aforementioned topics and explain a computational solution for some of them.

Keywords: Biological networks, Machine learning, Precision medicine, Drug recommendation, Cancer

IS22 Development of artificial enzymes with biomedical and industrial applications; Perspectives and future challenges

Gholamreza Dehghan, Samaneh Rashtbari -*Department of Biology, Faculty of Natural Sciences, University of Tabriz, Tabriz, Iran. E-mail: dehghan2001d@yahoo.com*

Natural enzymes, most of which are proteins, are catalysts that can speed up chemical reactions rate by reducing activation energy and mediated the biological processes under mild conditions. However, these biomolecules have some drawbacks including the high cost of synthesis, purification and low stability in extreme conditions of pH or temperatures for performing catalytic functions. So, due to these disadvantages and to overcome these limitations, easily synthesized, highly stable and low cost enzyme mimetic from molecules to inorganic nanomaterials have been developed. Developing many manmade enzymes (artificial enzyme mimetics), as alternatives to natural enzymes, using non-protein molecules become an interesting field for researchers. However, the disadvantages of enzyme mimetics are that the catalytic efficiency, specificity, and selectivity are relatively low. To date, many enzyme mimetics have been prepared and have activities analogous to cytochrome P450, serine protease, dioxygenase, phosphodiesterase, lipase, acylase, ligase, hydrolase, aldolase, superoxide dismutase, and nitrile hydratases. Nanomaterials are chemical entities at least one dimension smaller than 100 nm. With such an extremely small size and large surface area per unit of volume, nanomaterials have characteristic physical, chemical, photochemical, and biological properties that are very different from those of the same material in bulk form. Nano-based materials due to their physicochemical properties relative to bulk materials including large surface/volume ratios, optically active, mechanically strong and chemically reactive have various applications in different areas, including biosensing, catalysis, textile industry, drug delivery and water treatment. Enzyme mimetic behavior of some nanomaterials is one of the most interesting features of these materials which make nanomaterials as potential alternatives for natural enzymes. Nanomaterials, with enzyme mimic activities, which are called nanozymes, have gained much more attention among the researchers during the past decades because of their unique properties such as low-cost, high stability and simple preparation. Also, nanozymes have their catalytic activity even in the harsh environmental conditions of pH and temperatures. Nanoparticles' catalytic activity and intrinsic ability in generating or scavenging reactive

oxygen species (ROS) in general can be used to mimic the catalytic activity of natural enzymes. To date, many nanoparticles with enzyme-like activities have been found, potentially capable of being applied for commercial uses, such as in biosensors, pharmaceutical processes, and the food industry. The reported enzyme-like activities for nano-sized materials includes the superoxide dismutase-like (SOD like), oxidase-like, catalase-like, glucose oxidase-like and peroxidase-like activities. Also, enzyme-mimic activity of some metal-protein complexes have been reported, too. In general, artificial enzyme mimetics have been developed by using different non-protein molecules such as metal-complexes, metal-nanomaterials, polymeric and supramolecules.
Key Words: Artificial enzymes, nanomaterials, nanobiosensors, enzyme mimetic acticity

IS23 Biophysical understanding and control of living systems

Hamid Mobasheri- Professor of Biophysics *Institute of Biochemistry and Biophysics, University of Tehran, Tehran, Iran. E-mail: h.mobasheri@ut.ac.ir*

The physical nature and biophysics of the living systems in micro-organisms, plants and animals make them very susceptible to the various external irradiation sources including; electric, magnetic and electromagnetic fields. They also possess and make use of their own intrinsic fields for functioning, healing, communication and defend purpose. This is the way we can detect and recognize their functional state and control and manipulate their activities at organ, cellular, molecular, atomic and even subatomic levels. Clinical application of these very characteristics has mad us use EEG, EMG, EKG and Squid Magnetometers to detect the functional state of brain, muscles, heart and brain by means of their bioelectric and biomagnetic activities and status in a non-invasive and real time manner in animals and human being. Dolphins, sharks, electric Eeles, bats, honey bees and others rely on their intrinsic fields potentials to communicate, detect, navigate, defend and manage their life. In plants, squeezing, cutting and burning of the leaves have caused corresponding electrical signals comparably to electrical signals in animals nervous systems to transfer the information across the plant body. Magnetoproteins in certain strains of bacteria makes it possible to navigate using Earth magnetic field in oceans. Water, forming about 70% of the biological systems, possess magnetic momentum, electrical dipole characteristics, diamagnetic nature and provides appropriate platform for polyelectrolyte charged biological macromolecules such as enzymes, pumps, channels, robotic nano-motor proteins and so on to take appropriate conformation and dynamics and function properly. Here, the importance of biophysics in understanding the structure and function of living organisms and its application in the detection, control and treatment is discussed at atomic, molecular, cellular, organ and whole body levels. It will be shown that the above knowledge is necessary for all the undergraduate and postgraduate students in various fields of biological sciences to enable them solving corresponding problems living organisms are suffering from on the Earth in an efficient manner.
Keywords: Biophysics, Zoology, Botany, Microbiology, Environment, Clinical Sciences, Electric, Magnetic, Electromagnetic fields

IS24 Signaling pathway modeling for systematic study of diseases

Kaveh Kavousi -*Department of Bioinformatics, Institute of Biochemistry and Biophysics, University of Tehran. E-mail: kkavousi@ut.ac.ir*

Signaling pathways are a sequence of actions inside a cell, usually responsible for the transmission of a message from outside world to the nucleus. Finding disease-related signaling pathways is helpful in discovering the mechanism of the diseases, creating better drugs, and personalizing drugs for patients. Different Pathway analysis methods have been proposed to find and rank signaling pathways perturbed in a given phenotype. In this article, we review the approaches proposed by our research team to analyze the signaling pathways. These approaches are based on graphical models and formal methods for modeling signaling pathways. In the first method, a new pathway enrichment analysis method, BNrich, is introduced. This method has been applied on data related to systemic lupus erythematosus (SLE), to underscore key molecular characteristics of SLE pathogenesis, which may serve as effective targets for therapeutic intervention. After that, two formal methods are introduced, the first one models the signaling pathways using PRISM language and assign weights to gene-gene interactions, and the second uses Petri net for modeling, which have advantages over other formal methods, because of its graphical and hierarchical structure. Based on these proposed methods, two tools called FoPA and PAPet have been developed, in Python and R programming languages.

Keywords: signaling pathway, graphical model, formal method, petri

IS25 Design of antimicrobial and anticancer peptides based on membrane and peptide biophysical properties

Mahboobeh Zarrabi -*Computational biology laboratory, Biotechnology department, Faculty of biological science, Alzahra University. E-mail: m.zarrabi@alzahra.ac.ir*

Peptides are a unique group of pharmaceutical compounds whose intrinsic function and nature in regulating the cellular and physiological processes of the human body have made it possible to mimic and benefit from these characteristics in the treatment and drug design. Therapeutics peptides due to their small size, ease of synthesis, ability to penetrate cell membranes, high activity, specificity and biological and chemical diversity are suitable candidates for the treatment of many diseases. Antimicrobial and anticancer peptides are a group of therapeutic peptides that in addition to antibacterial, fungal, and viral properties can affect the immune system and have an effective role in the removal of cancer cells. Due to the expansion of databases in the field of therapeutics peptides, the use of computational methods such as artificial intelligence and machine learning has made it possible to design and modify the performance of these peptides. The cell membrane is the first barrier to penetrate and binding the factors that cause cell destruction. Changing the membrane content and its physical properties determines how the therapeutics peptides interact with the membrane. The interactions between proteins and membranes play critical roles in signal transduction, cell motility, and transport, and they are involved in many types of diseases. Molecular dynamics (MD) simulations have greatly contributed to our understanding of protein–membrane interactions. In this study, the binding, penetration, and interaction of natural and designed antimicrobial and anticancer peptides with different membranes was investigated by the molecular dynamics simulation. All the simulations were run for at least 200 ns using the GROMACS package and then peptide penetration in the membrane was evaluated by different analyses. The results show that the penetration rate, mechanism of action of the peptide, and interaction peptide with membrane depends on the characteristics of the peptide such as sequence length, hydrophobicity, charge, peptide orientation on the membrane, amino acidic composition, and its concentration. The lipid composition of different membranes, the presence of cholesterol in the membrane, and fluidity and symmetry in the membrane will be important factors affecting the interaction of peptides with membrane.

Keywords: molecular dynamics, membrane, therapeutics peptides, penetration

IS26 Pan-cancer analysis of microRNA expression profiles highlights microRNAs enriched in normal body cells as effective suppressors of multiple tumor types

Sharif Moradi, PhD-*Department of Stem Cells and Developmental Biology, Cell Science Research Center, Royan Institute for Stem Cell Biology and Technology, ACECR, Tehran, Iran. E-mail: sh.moradi@royan-rc.ac.ir*

MicroRNAs (miRNAs) are frequently deregulated in various types of cancer. While antisense oligonucleotides are used to block oncomiRs, delivery of tumour-suppressive miRNAs holds great potential as a potent anti-cancer strategy. Here, we aim to determine, and functionally analyse, miRNAs that are lowly expressed in various types of tumour but abundantly expressed in multiple normal tissues. By compiling all publicly available miRNA profiling data from The Cancer Genome Atlas (TCGA) Pan-Cancer Project, we reveal a small set of tumour-suppressing miRNAs (which we designate as 'normomiRs') that are highly expressed in 14 types of normal tissues but poorly expressed in corresponding tumour tissues. Interestingly, muscle-enriched miRNAs (*e.g.* miR-133a/b and miR-206) and miRNAs from *DLK1-DIO3* locus (*e.g.* miR-381 and miR-411) constitute a large fraction of the normomiRs. Moreover, we define that the CCCGU motif is absent in the oncomiRs' seed sequences but present in a fraction of tumour-suppressive miRNAs. Finally, the gain of function of candidate normomiRs across several cancer cell types indicates that miR-206 and miR-381 exert the most potent inhibition on multiple cancer types *in vitro*. Overall, our results reveal a pan-cancer set of tumour-suppressing miRNAs and highlight the potential of miRNA-replacement therapies for targeting multiple types of tumour.

Keywords: tumorigenesis, cancer cell, miRNA, cell viability, proliferation

IS27 From Birth to Birth

Massoud Houshmand−*National Institute for Genetic Engineering and Biotechnology, Tehran, IRAN. E-mail: massoudh@nigeb.ac.ir*

Newborn screening is the practice of testing every newborn for certain harmful or potentially fatal disorders that aren't otherwise apparent at birth. With a simple blood test, doctors often can tell whether newborns have certain conditions that eventually could cause problems. Although these conditions are rare and most babies are given a clean bill of health, early diagnosis and proper treatment sometimes can make the difference between lifelong impairment and healthy development. **Child package** A successful future begins when parents understand and devote themselves to develop the potential their child possess since birth. The Inborn Talent Genetic Test (ITGT) helps parents like you to discover your child's talents that may not be obvious at a young age along with personality traits that they have. Knowing your child's genetic make-up allows you to take control of their development to nurture their talents. It also allows you to intervene in their weaknesses at an early stage before it takes root in your child. With the career profiling report that comes with the genetic test, this test package is the roadmap for you to plan your child's future towards success. **Preconception Gene Profile** is a genetic test aimed at prospective parents to determine if they are **carriers** or not for certain hereditary diseases. Preconception Gene Profile allows establishing the genetic risk of having affected offspring and, thanks to adequate genetic counselling, offering to the prospective parents the different **reproductive options** available according to their situation, in a personalized manner. **Non-Invasive Prenatal Tests (NIPT)** which allos the genetic analysis of the fetus early in pregnancy by carrying out a fetal genetic analysis using a maternal blood sample that contains cell-free fetal DNA. SG Baby Test is designed to assess the risk of the fetus of being a carrier of aneuploidy (abnormal number of chromosomes) **Multifactorial Disorders Nutrition and sport Skin and beauty Cancer Genetic ancestry** testing, or genetic genealogy, is a way for people interested in family history (genealogy) to go beyond what they can learn from relatives or from historical documentation. Examination of DNA variations can provide clues about where a person's ancestors might have come from and about relationships between families. Certain patterns of genetic variation are often shared among people of particular backgrounds. **DNA paternity** testing determines the biological father of a child. We all inherit our DNA from our biological parents — half from our mother and half from our father. A DNA paternity test compares a child's DNA pattern with that of the assumed father to determine if there is a match.

IS28 Scale-up Production of Liver Organoids

Ensieh Zahmatkesh, Massoud Vosough -*Royan institute for stem cell biology, Regenerative Medicine Department, Tehran, IRAN. E-mail: masvos@yahoo.com*

Liver organoids (LOs), are attracting growing interest for drug screening and disease modeling or transplantable constructs for tissue regeneration. Hepatocytes, the key component of LOs, isolated from liver or generated by differentiation of pluripotent stem cells (PSCs). PSCs are preferable because of their availability, scalability, and potential for personalized treatments. However, maturation of the PSC-derived hepatocytes to functional unites in LOs has yet remained challenging. Incorporation of cell-sized microparticles (MPs) derived from liver extracellular matrix could provide a tissue-specific microenvironment for further maturation of hepatocytes inside the LOs. The MPs were fabricated by chemical cross-linking of a water-in-oil dispersion of digested decellularized liver tissue. These MPs were mixed with human PSC-derived hepatic endoderm cells, human umbilical vein endothelial cells and mesenchymal stromal cells to produce homogenous bioengineered LOs (BLOs). BELOs showed enhanced maturation of hepatocytic specific genes and function e.g., CYP activities, Alb secretion and metabolism of xenobiotics. Efficient hepatic maturation and integration resulted after *in vivo* and *ex ovo* transplantation either. Ectopic transplantation of BELOs in mice with acute liver injury improved survival rate. In conclusion, MPs incorporated in BLOs improved maturation of hepatocytes compared to LOs. BELOs represents a novel tool for drug screening, toxicology and potential translational applications. Moreover, this approach could be likely implemented as a versatile strategy to produce functional organoids from different sources.

Keywords: Liver organoid, Tissue specific Microparticle, Pluripotent stem cell, Hepatic differentiation, Tissue engineering

IS29 Structure function relationship in active and inactive Apaf-1 in apoptosome formation

Saman Hosseinkhani[1], Ali-Reza Noori[1], Maryam Nikkhah[1] -*1. Department of Biochemistry, Faculty of Biological Sciences, Tarbiat Modares University. Tehran, Iran. E-mail: saman_h@modares.ac.ir*

In multicellular organism, apoptosis is one of the programmed cells death pathway in which is vital for development and regulation of homeostasis. During apoptosis and other programmed cell death pathways formation of large protein complexes is one of the main hallmarks. We have used split luciferase complementary assay to monitor protein-protein interactions in mentioned complexes like apoptosome, necrosome and inflammasome. During apoptosis, apoptosome formation is the main bottleneck for cell death progress, in which Apaf-1 is an adaptor that activates caspase-9. Structural studies suggest that normally Apaf-1 is held in an inactive conformation (Latent form) by intramolecular interactions between Apaf-1's nucleotide binding domain and one of its WD40 domains (WD1). Based on molecular model of Apaf-1 activation, cytochrome *c* binds to sites in WD1 and in Apaf-1's second WD40 domain (WD2), moving WD1 and WD2 closer together that allows Apaf-1 to bind dATP or ATP and to form the apoptosome then activates caspase-9. We investigated the effect of one WD domain (Apaf-1 1-921) deletion on Apaf-1 interactions and caspase cascade activation. Trucated Apaf-1 (1-921) could not activate caspase-9, even in the presence of cytochrome *c* that suggest a single WD domain is sufficient to lock Apaf-1 in an inactive state and that this state cannot be altered by cytochrome *c*.

IS30 Applications of integrative biology to address global challenges

Massoud Ranjbar -*Department of Biology, Herbarium Division, Bu-Ali Sina University, P.O. Box 65175/4111, Hamedan, Iran. E-mail: ranjbar80@yahoo.com*

As the name "Integrative Biology" reflects the belief that the study of biological systems is best approached by incorporating many perspectives like communicative and integrative biology, cellular biology, molecular biology, tissue biology, developmental biology, evolutionary biology, computational biology, structural biology, mathematical biology, and integrative and comparative biology. We bring together a diversity of disciplines that complement one another to unravel the complexity of biology. The concept includes anatomy, physiology, cell biology, biochemistry and biophysics, and covers all organisms from microorganisms, animals to plants. Our broad range of expertise includes cell biologists, geneticists, physiologists, behaviorists, morphologists, microbiologists, computational biologists, systems biologists, structural biologists, ecologists, biophysicists, and biotechnologists. IB is a multi- and interdisciplinary approach for researches using experimental or computational quantitative technologies to characterize biological systems at the molecular, cellular, tissue, and population levels. It mainly included investigations that contribute to a quantitative understanding of how component properties at one level in the dimensional scale (nano to macro) determine system behavior at a higher level of complexity. Today, more than ever, biology has the potential to contribute practical solutions to many of the significant challenges confronting the world. IB for the 21st Century recommends greater integration within biology, and closer collaboration with physical, computational, and earth scientists, mathematicians, and engineers be used to find solutions to five vital societal needs: sustainable food production, climate change, ecosystem restoration, optimized biofuel production, and improvement in human health.

IS31 Ecological Responses of Algal Community to Hydrological Changes in the MacKenzie River, Australia: Implications for River Basin Management

Ehsan Atazadeh*[1] -*1. Assistant Professor, Department of Plant Biology, Faculty of Natural Sciences, University of Tabriz, Iran. E-mail: atazadeh@tabrizu.ac.ir*

Today, many rivers and wetlands have been heavily regulated to ensure adequate provision of water resources for anthropogenic uses. Aquatic ecosystems, especially those in arid and semi-arid regions, are experiencing severe stress due to the increasing demands on the ecosystem services they provide. In this study, samples of diatoms, soft algae and measurements of water quality were analysed at ten sampling sites for three years

(between February 2012 and November 2014) along the MacKenzie River to understand the spatial and temporal variation in the relationship between algal communities, water quality and stream condition. Baseline information on algal communities and water quality was collected during base flow conditions, while experiments on the effect of water releases on algal communities were based on flow regime variations (manipulated flow regimes), specifically on the algae community structure, water quality and ecosystem function. Algal species composition changed along the river under different flow regimes and different seasons. Under base flow, diatoms were more abundant upstream and filamentous green algae were more abundant downstream. The results showed that the algal composition shifted downstream after water release events. Green algae, Cyanobacteria and Chrysophyta gradually increased from upstream to downstream under base flow conditions, and before water releases, whereas diatoms were greater upstream and increased downstream after water releases. The results suggest that by tailoring the discharge and duration of the river flows, through the amalgamation of consumptive and environmental flows would improve the condition of the stream, and supplementing the positive effects of the flows dedicated to improving environmental outcomes.
Keywords: Algae, Ecology, River management, Biodiversity

IS32 Identification of Medicinal Plants Value Chain, Challenges and Opportunities (Case Study of Thyme)

Farzanr Bahadori*, Ebrahim Sharifi Ashorabadi, Ali Ashraf Jafari, Mehdi Mirza - *Agricultural and Natural Resources research center of Semnan province, Areeo, Semnan, iran. E-mail: farbahadoi@gmail.com*

Nowadays, 80% of the world's population, especially in developing countries, are dependent on medicinal plants for treatment. According to the World Health Organization, about 25% of all medicines used worldwide are derived from plants and their derivatives. Preserving the genetic resources of plant species in natural habitats is essential. Therefore, with the aim of increasing the quality and quantity of the final product and achieving homogeneous and uniform medicinal plant to meet the growing global demand, the policy of cultivation and domestication of medicinal plants in the agricultural conditions was prioritized. Thyme species are important medicinal plants in the world due to their various valuable compounds. In this paper, the research path from identifying different thyme wild populations, studying germination needs, seedling production and establishing different populations in one place, multiple species evaluations to identifying superior and compatible ones in Semnan province as a practical example of the medicinal plant breeding program will be reported in this presentation.
Keywords: domestication, breeding, thymus spp, essential oil, thymol

IS33 15 years of taxonomic study on the genus *Silene* (Caryophyllaceae) in Iran a pattern for taxonomic studying of species rich genus in Iran

Abbas Gholipour* -*Department of Biology, Payame Noor University, Tehran, Iran. E-mail: a.gholipour@pnu.ac.ir*

The genus *Silene* (Caryophyllaceae) with about 118 species, is an important and problematic taxon in Iran. 15 years taxonomical studies in different aspects of the genus in Iran including; extensive new collection, herbarium specimens examination, nomenclature, morphometry, anatomy, ecology, chromosome features, Seed and pollen micromorphology, and phylogeny has led to changes in its taxonomy. During these studies, 3 new species; *S. mishudaghensis*, *S. oxelmanii* and *S. circumcarmanica were* described, 2 sections (*Scorpioideae* and *caespitosae*), 9 *Silene* species and *S. odontopetala* subsp. *congesta* were recorded for the first time from Iran. *S. eremicana* has been considered as distinct taxon and 3 species has been determined as synonymous of other species. At all, chromosome number information of 70 species was reported for the first time from Iran. Anatomical features of 45 species was studied and leaf and stem epidermis characteristics of 75 Iranian *Silene* species was described. Seed and pollen micromormorphology of 65 and 70 species respectively was studied and described by using scanning electron microscope. According to the available information, about 60% of species of this genus have been studied up to now, so that providing a new and complete classification at the section level and intraspecific variations requires more information. Considering the existence of about 20 genera with more than 40 species in Iran, the step by step model of taxonomic study performed in the genus *Silene* includes; Extensive sampling at population level from all natural habitats, detailed study of morphology and correct determining of taxa, resolving the nomenclatural problems of taxa, description of habitat features,

phtyogeography, anatomy, chromosome features, micromorphological studies of Seeds and pollen, embryology and reproductive systems and finally phylogenetic study can be a suitable model.

Keywords: *Silene*, Taxonomy, species rich genus, Seed micromorphology, Iran

IS34 The Value of Micromorphological Studies in Poaceae

Maryam Keshavarzi -*Plant Sciences Dept., Faculty of Biological Sciences, Alzahra University, Tehran, Iran. E-mail: m.keshavarzi@alzahra.ac.ir*

Poaceae is the fourth largest flowering plant family in the world that is adapted to different types of habitats. There are 12 subfamilies with 50 tribes and 81 subtribes in Poaceae. The efficiency of micromorphological data in systematic studies of the Poaceae is documented for the leaf blade epidermis, Glumes, lemmas, and paleas especially at the subfamily and tribal levels. Micromorphological features in lemma and palea as shape and distribution of silica bodies, long and short cells, different hair types as prickles, macro-hairs, and crown cells are of taxonomic importance. Intercoastal long cells are show different outlines and wall shapes. Straight wall and different undulation as curved, U-shaped, V-shaped, and especially Ω-shaped are found in Poaceae. In intercoastal zone, short cells are of diagnostic importance in form of their presence or absence and their shape. Silica bodies as an anti-feedant agent in the grasses caused enhanced strength and rigidity. By the presence of silica bodies, the water loss via cuticle is decreased. It is especially very functional in tolerance to the lodging, fluctuation in temperature, radiation, and drought stresses. Different shapes of silica are of taxonomic importance. Epicuticular wax is a functional tool in confrontation with the environmental aridity by decreasing the water loss via epidermis surface and stomata. The presence of diketone-tubules, platelets, and longitudinally aggregated rodlets types in the grass family have been documented. The micromorphological variation in different groups of Poaceae taxa in Iran will be discussed to show the taxonomic value of several micromorphological characteristics of the leaf blade, lemma, and palea.

Keywords: leaf epidermis, glume surface, diagnostic features, Iran

IS35 The phylogeny of Rosoideae (Rosaceae) in Iran, based on cpDNA and nrDNA sequenced data

Marzieh Beygom Faghir -*Department of Biology, Faculty of Science, University of Guilan, Rasht, Iran. E-mail: marziehbeygomfaghir@gmail.com*

The present survey deals with phylogenetic analyses of Rosoideae from Iran. A total of 34 taxa from 6 tribes and 4 subtribes of Iranian taxa plus 36 previously sequenced data were analyzed for *trn*L-F, *rpl*32-*trn*L (UAG) PsbA-trnH and nrDNA ITS regions. For data analysis, both Maximum parsimony (as implemented in PAUP) and Bayesian method (using MrBayes program) was used. In all the reconstructed phylogenetic trees, the following clades are given phylogenetic definitions: Colurieae, Agrimonieae, Potentilleae and their subclades. The monophyly of Colurieae, Agrimonieae, Potentilleae were well documented.The current results support circumscriptions of the genera *Geum*, *Agrimonia* and *Aremonia* (presented in Flora of Iran). However, it displays divergence of the genus *Sanguisorba* in to two monophyletic groups (a) *Sanguisorba minor* and three subspecies b) *Sanguisorba officinalis* group) and the union of the genera *Fragaria, Alchemilla, Aphanes, Drymocallis, Sibbaldia* and *Sibbaldianthe* within *Fragariinae* and *Duchesnea, Ivesia , Horkelia* and *Argentina* within *Potentilleae*. In this study, the evolutionary trend of exin sculpturing was discussed.

Keywords: Cladistics analysis, Rosaceae, Colurieae, Agrimonieae, Potentilleae

IS36 Inhibitory effects of some mosses extracts on phytopathogenic fungi *in vitro* and *in vivo*

Roghaieh Asadboland[1], Mohammad Reza Eslahi[*2], Ali Reza Iranbakhsh[1], Saeed Shirzadian[3] -*1. Department of Biology, Science and Research Branch, Islamic Azad University, Tehran, Iran 2. Plant Protection Department, Khouzestan Agriculture and Natural Resource Research and Education Center, Agricultural Research, Education and Extension Organization, AREEO, Ahvaz, Iran 3. Department of Botany, Iranian Research Institute of Plant Protection, Agricultural Research, Education and Extension Organization (AREEO), Tehran, Iran. E-mail: mr_eslahi@yahoo.com*

Mosses are a group of simple, small and xerophyte plants that have been shown to have anti-cancer, anti-microbial and anti-fungal effects.In order to evaluate the antifungal effects of mosses, the extracts were made

using ethanol, methanol, acetone and distilled water then they were tested against four phytopathogenic fungi *Rhizoctonia solani*, *Fusarium solani*, *F. pseudograminareum*, and *Bipolaris sorokiniana* on PDA medium by using disc-diffusion method and compared with the effects of industrial fungicides Benomyl, Difenoconazole and Tetraconazole. The experiment was conducted with three replications. Finally, data were processed using SAS 9.2 software. Statistical analysis of results was based on Duncan significance test. Differences of $p<0.05$ were considered significant. The results showed that, ethanolic extracts produced significant inhibitory effects on tested fungi. In order to investigate the effect of moss extracts *in vivo*, wheat seeds of "Chamran" cultivar were implanted into moss extract and then transfered into pots containing 1: 10 mixture of soil and soil contaminated with tested fungi. After 35 days, the root and crown of wheat plants were examined. *In vivo* observations had also indicated that, ethanolic extracts can control the root and crown rot significantly.

Keywords: Mosses, Extract, Benomyl, Difnoconazole, Tetraconazole

IS37 A Survey of Moss flora of Zagros Mountains in Khouzestan Province

Roghaieh Asadboland[1], Saeed Shirzadian[*2], Ali Reza Iranbakhsh[1], Mohammad Reza Eslahi[3] -*1. Department of Biology, Science and Research Branch, Islamic Azad University, Tehran, Iran 2. Department of Botany, Iranian Research Institute of Plant Protection, Agricultural Research, Education and Extension Organization (AREEO), Tehran, Iran 3. Plant Protection Department, Khouzestan Agriculture and Natural Resource Research and Education Center, Agricultural Research, Education and Extension Organization AREEO, Ahvaz, Iran. E.mail: shirzadian2003@yahoo.co.uk*

Khouzastan Province is situated in South-west of Iran. It covers an area of 63633 km^2, which lies between the latitudes of 29° 57´ N and 33° 00´ N and the longitudes of 47° 40´ E and 50° 33´ E. The elevation varies between sea level in Persian Gulf beaches to 3500 m in Sefidkoh Mountain.For this study, the moss samples were collected from seven location during summer 2018-2020. Samples were collected in paper bags and field data were recorded. The samples were air-dried in room temperature and stored in the standard paper packet. For morphological observations, the samples were soaked in hot water for a few minutes for their revival. Identification of the specimen was made with the help of Smith (2004) Frey *et al*. (2006), Kürschner (2007), ،((Athertonn *et al*., 2010) and Kürschner and Frey (2011). The voucher specimen is preserved in the herbarium of the Ministry of Jihad-e Agriculture ("IRAN") at the Iranian Research Institute of Plant Protection (Tehran, Iran). After field trips in suitable seasons, 12 species belong to 11 genus and six families were identified. One species belonging to Pottiaceae namely *Dialytrichia mucronata* was new to Iran.

Keywords: Mosses, Khouzastan Province, Zagros Mountains, Acrocarpous, Pleurocarpous.

IS38 OMICS approaches towards deeper insight into cellular processes: genome projects and decoding the genomic and transcriptomic data

Seyed Alireza Salami -*University of Tehran, Tehran, IRAN. E-mail: asalami@ut.ac.ir*

Cellular processes are controlled at various levels and consequent of a series of hierarchical processes related to genome, transcriptome, proteome and metabolome ultimately determines the phenotype of an organism. The ultimate aim of genomics and transcriptomics is to identify the structure and function of all the genes of all organisms. In recent years, the emergence of new high- throughput technologies such as Next generation Sequencing (NGS) along with various OMICS approaches has revolutionized molecular biology. Complete genome sequences will provide powerful tools for biologists. The sequences will aid in understanding how gene families have been created, amplified, and diverged, resulting in the creation of new biological activities and specificities. The gene content of related species can be compared to identify which pathways are shared among many species and which are restricted to some parts of the kingdom. The new tools and approaches that are available for investigating gene structure and function have been steadily developed over the past 20 years. Today the molecular tools include various cloning systems like GateWay and TOPO cloning, micro array, high-throughput Next Generation Sequencing, and mass spectroscopy (MS) which led to a great revolution in biology along with gene and genome editing approaches like CRISPR-Cas9. The application of these methodologies results in the generation of very large amounts of data i.e. data tsunami that need to be stored, processed and analysed. On the other hand, these challenges led to the development of various bioinformatics algorithms and it has made the computational biology and big data more prominent. The wealth of data generated by high-

throughput methodologies will advance our understanding of gene structure and function. In addition, the ability to change gene expression in vivo, by using insertional mutagenesis, RNA interference, or other silencing mechanisms, will be crucial in determining the specific function of a particular gene. Therefore, at the present time, techniques are available to identify a specific phenotype. In the past the genome projects were limited to a few organisms such as Arabidopsis, human, rice and wheat, while, with the advent of Next and Next-Next Generation Sequencing technologies, complete sequences of genomes and transcriptoms of many organisms have been released in shorter intervals.

Keywords: Databases, Gene network, Big data, Computational biology, Algorithm

IS39 SARS-CoV-2: genome evolution, possible causes of divergenve and expansion of somelinage, and the pathogenic importance of different variants

Iman Safari, Kolsoume Inanloo,Elahe Elahi- *School of Biology, University College of Science, University of Tehran,Tehran,Iran*

IS40 Prefrontal cortical-hippocampal-amygdala functional loop in memory formation

Ameneh Rezayof- *Department of Animal Biology, School of Biology, College of Science, University of Tehran, Tehran, Iran. E-mail: arezayof@ut.ac.ir*

The involvement of the prefrontal cortex, the hippocampus and the amygdala in learning and memory processes has been studied over the past 30 years. However, the neurotransmitter mechanisms underlying functional interactions among these brain sites in memory formation are not fully understood. Our studies using animal models suggest that the direct and indirect pathways among the prefrontal cortex, the hippocampus and the amygdala, which form a functionally important loop, may be critically involved in cognitive functions. It seems that the loop activation occurs when the hippocampus encrypts new information to store as long-term memory. The hippocampal projections to the PFC and the amygdala can change their activities to generate synaptic long-term potentiation or depression which is necessary for memory formation. The hippocampus is functionally divided into the dorsal part which is necessary for memory formation and the ventral part which is associated with both memory and emotional behaviors. The prefrontal cortex (PFC) as an important component in the central nervous system plays a key role in long-term and short-term memory. The amygdala connects with the PFC and the hippocampus through the efferent and afferent projections to create long-term emotional memory. The dysregulation of the PFC/hippocampal/amygdala neurotransmission may be a major reason for the memory loss. We found that there is an association between memory formation or impairment with the changes of BDNF/cFOS/CAMKII/CREB signaling pathways in the PFC, the hippocampus and the amygdala. Moreover, the different neurotransmitter systems including glutamatergic, GABAergic, dopaminergic and endocannabinoid systems in these brain areas have critically been involved in the reward-related memory. Taken to gather, these findings support the existence of a functional loop among the PFC, the hippocampus and the amygdala during processing learning and memory.

Keywords: Learning and memory, Neurotransmission, Signaling pathways, Animal models

IS41 Wnt signaling in dopaminergic neuron development and degeneration

Azita Parvaneh Tafreshi- *Dept. of Molecular Medicine, Faculty of Medical Biotechnology, The National Research Institute for Genetic Engineering and Biotechnology, Pajohesh Boulevard, Hamedani highway, Tehran, Iran. 14965-161. E-mail:tafreshi@nigeb.ac.ir*

Parkinson's disease (PD) is one of the most common neurodegenerative diseases in elderlies. Degeneration of dopamine-producing cells in the midbrain nucleus of the substantia nigra during years of the disease progression results in PD. Among the signaling pathways, the Wnt pathway have been suggested to modulate the differentiation and survival of dopaminergic neurons, both during embryonic development and adulthood. Activation of the Wnt pathway requires phosphorylation and inactivation of the enzyme glycogen synthase kinase 3 beta (GSK-3β) at serine 9 which leads to the expression of Wnt target genes such as C-myc and cyclin D1. Wnt pathway is activated by variety of ligands, such as lithium and the indirubins, natural alkaloids extracted from the indigo colored plants and molluscs. While lithium is a general activator of the Wnt, the indirubin BIO is a specific inhibitor of GSK-3β, both of which lead to the expression of Wnt target genes. Using the SH-SY5Y cell line with dopaminergic differentiation potential, we showed that lithium enhanced their

dopaminergic differentiation and BIO protected them from toxicity induced by MPP+, a dopaminergic neurotoxin. We have further showed that the effect of BIO is mediated by microRNAs as novel diagnostic and therapeutic candidates for PD. Altogether, Wnt pathway efficiently modulates survival and differentiation of dopaminergic neurons.

Keywords: Parkinson's disease, SH-SY5Y, lithium, 7-BIO, MPP^+

IS42 Role of non-coding RNAs in morphine function

Shamseddin Ahmadi- *Department of Biological Science, Faculty of Science, University of Kurdistan, Sanandaj, Iran. E-mail:Sh.ahmadi@uok.ac.ir*

Morphine is widely used in medicine to control moderate to severe pain. However, long-term administration of morphine is accompanied by unfavorable phenomena like tolerance and dependence to the drug. The exact molecular mechanisms underlying morphine tolerance and dependence have remained unclear. The effects of morphine are mediated via its binding to opioid receptors, which are distributed throughout the central and peripheral nervous systems. Further, data also indicates that alterations at other neurotransmitter receptors and downstream signaling pathways are also involved in morphine tolerance and dependence. Changes in gene expression have been reported in different brain areas, including the midbrain, striatum, hippocampus, and cortex following tolerance and addiction to morphine. However, central epigenetic changes during tolerance and addiction to morphine remain unclear. non-coding RNAs (ncRNAs) constitute the majority of the transcriptome in the brain and play essential roles in regulating cellular processes. ncRNAs are commonly linear molecules that are divided into housekeeping and regulatory subgroups. The former includes ribosomal (rRNA), transfer (tRNA), small nuclear (snRNA) and small nucleolar (snoRNA) RNAs that are ubiquitously expressed and contribute to structural and functional homeostasis. On the other hand, regulatory ncRNAs are involved in gene regulation and are typically divided into two categories based on their length. The first category includes RNAs with lengths fewer than 200 nucleotides; these RNAs include micro-RNAs (miRNAs), small interfering RNAs (siRNAs), and RNAs associated with the Piwi protein or piRNAs. ncRNAs containing more than 200 nucleotides are referred to as long ncRNAs (lncRNAs), which are involved in a variety of biological processes, including gene expression. It is also worth noting that circular RNAs (circRNAs) are a unique class of ncRNAs covalently-linked ends with having more than 200 nucleotides that are produced due to a back-splicing process. Reports during the past two decades indicate the involvement of ncRNAs in addiction to morphine, alcohol, methamphetamine, cocaine, and heroin. Our data indicate the involvement of different miRNAs, including miR-124, miR-133, miR-339, miR-365. Others and we have also shown that changes in the expression of long non-coding RNAs such as BC1, H19, MALAT1, and MIAT1 as well as circular non-coding RNAs such as CircOprm1 in different areas of the brain and spinal cord after morphine treatment in rats, which indicate the involvement of these RNAs in the effects of morphine. It can be concluded that the analgesic effects of morphine and its adverse effects such as addiction resulted from its repeated use are mediated by changes in the expression of various genes and non-coding RNAs have a significant role in the effects of morphine due to their regulatory role in regulating gene expression processes in the nervous system. Therefore, they should be given more attention in future research and their performance in morphine function needs further investigations.

Keywords: Pain management, Tolerance, Addiction, Gene regulation, non-coding RNAs

IS43 Selection of competent oocytes for assisted reproductive technologies

Azam Dalman- *Department of Embryology, Reproductive Biomedicine Research Center, Royan Institute for Reproductive Biomedicine, ACECR, Tehran, Iran Email:a.dalman@royan-rc.ac.ir*

Oocyte competence or quality have defined as the ability of oocyte to resume meiosis, cleave following fertilization, develop and differentiate into blastocyst stage, induce pregnancy and finally bring healthy offspring. Oocyte maturation is one of the most important processes of oogenesis, since it leads to the generation of "competent fertilizable oocytes". Oocyte maturation include nuclear maturation, cytoplasmic maturation, and Epigenetic maturation which is precisely regulated by molecular factors. Invasive and noninvasive methods are commonly used to select developmentally competent oocytes that can improve the take-home baby rates in assisted reproductive technology (ART) centers. One of the noninvasive methods conventionally utilized to

determine competent oocytes is the morphological analysis of cumulus complex, first polar body, zona pellucida, perivitelline space, meiotic spindle, and ooplasm. however, all morphological criteria that are currently used for the grading and screening of oocytes are not able to eliminate the subjectivity. Despite recent studies of the molecular factors related to oocyte quality, it is technically difficult to develop an index based on these factors, and new indices that reflect intracellular conditions are necessary. The numerous transcriptomics, proteomic and metabolomic studies have been conducted in the follicular fluid and follicular cells (granulosa and cumulus cells) in order to find non-invasive biomarkers of oocyte quality. Recent studies have uncovered the presence of cell-secreted vesicles in follicular fluid. Moreover, these cell-secreted vesicles contain small non-coding regulatory RNAs called microRNAs, which can be shuttled between maturing gametes and surrounding somatic cells. In humans, it is known that extracellular microRNAs of follicular fluid are associated with fertilization ability and early embryo quality. Recently, oocyte condition can be evaluated noninvasively using a temperature imaging system. The dynamic changes in the cytoskeleton and mitochondrial activity are considered to contribute to intracellular thermal variations. Intracellular temperature in mature oocytes was higher in fresh oocytes immediately after PB1 extrusion, and the temperature decreased with time after polar body release. The differences in oocyte intracellular temperature can correlate with developmental competence. Fresh oocytes had high-temperature regions localized around the cell membrane and around the spindle. Further studies should evaluate the link between temperature and cellular phenomena to establish its use as an indicator of quality.

Keywords: Oocyte quality, oocyte maturation, follicular fluid, microRNA, temperature

IS44 A review on the role and importance of oribatid mites, taxonomy and status of species reported from Iran

Mohammad Ali Akrami- *Professor of Plant Protection, School of Agriculture, Shiraz University* **.** *Email:akrami@shirazu.ac.ir*

Acari (Ticks & Mites) are an important group of arthropods, and along with scorpions, tarantulas, spiders, etc. situated in the class of Arachnida. These tiny creatures are cosmopolitan, and so far more than 50,000 species have been reported worldwide, and it is estimated that the number of mite species reaches half a million. Among the mites, Cryptostigmata, which also known Oribatida (Order Sarcoptiformes), as one of the largest groups, occupies the predominant fauna of most soils. So far, more than 11,000 species and subspecies of these mites have been described. These mites benefit from a wide range of food and feed on fungi, mosses, lichens, plants and sometimes carrion, and are actively involved in the decomposition of organic matter and the formation of soil nutrients and soil texture. In addition to the effective role of these mites in the decomposition of organic matter, their importance as bioindicators in soil and air management, control of some pests, diseases and weeds, as well as being in the cycle of transmission of animal parasites as intermediate hosts, is considered. Is. However, unfortunately, in our country, no comprehensive scientific research has been done on the taxonomy of these mites, and only a few species have been reported in the form of master's and doctoral dissertations from different parts of the country. At present, about 400 species of oribatid mites are reported from Iran, of which approximately 30% belong to the primitive group (Macropylina) and the rest to the higher group (Brachypylina). The family Oppiidae is known as the richest family in terms of number of species. Among the species reported from Iran, about 40 new species have been described, most of which have been named "Iran". Due to the diversity of habitat and climate in Iran, it is expected that there are many unknown species in this vast and ancient land.

Keywords: Arthropod, Cryptostigmata, fauna, Distribution, taxonomy

IS45 An overview of assisted reproductive technology procedures

Fatemeh Hassani*-*Department of Embryology, Reproductive Biomedicine Research Center, Royan Institute for Reproductive Biomedicine, ACECR, Tehran, Iran Email:Fatima1737@yahoo.com*

Infertility is a major issue in the lives of couples who suffer from it and endure a lot of social and psychological pressures. Unfortunately, 1 to 6 couples remain in infertile societies and 10% of them need assisted reproductive technology. The birth of Louis Brown in July 1978 with the help of this technology was an important turning point for infertile couples, which is now considered as an important and internationally recognized treatment

option. Since then, significant improvements have been made in the knowledge of reproductive biology and biotechnology. The outcome of treatment is not very satisfactory and the average pregnancy rate worldwide is 30-34%. The rate of congenital anomalies and abnormalities is slightly higher than the normal population, which is related to a woman's age and has nothing to do with this treatment. Assisted reproductive techniques include ICSI, IUI, IVF, ZIFT, GIFT, IVM, PGD, PICSI, assisted hatching and embryo cryopreservation. In vitro fertilization and intracytoplasmic injection are the most common methods of treating infertile couples and allow artificial insemination outside the body. Indications for IVF include absent fallopian tubes or obstruction of bilateral. Endometriosis, male infertility, secondary infertility, unexplained infertility and genetic diseases leading to miscarriage or abnormal birth. The injection of an immobilized mature sperm into the cytoplasm of a mature metaphase II oocyte is known as intracystoplasmic sperm injection. Indications for ICSI include recurrent failure in IVF, severe oligospermia, severe asthenospermia, sperm obtained by TESE, PESA, TESA methods in obstructive and non-obstructive azoospermia, and frozen sperm. The steps of assisted reproductive techniques include ovulation stimulation, ovarian response assessment, oocyte retrieval, sperm preparation, IVF / ICSI, and embryo transfer.

Keywords: ICSI, IVF, Severe Oligospermia, Non-obstructive azoospermia, Unexplained infertility

IS46 Exosome application in cancer diagnosis and therapy

Farnoosh Attari- *Department of Animal Biology, School of Biology, College of Science, University of Tehran, Tehran, Iran. E.mail: attari@ut.ac.ir*

Exosomes are natural nanovesicles with 50-100 nm sizes, which contain proteins, nucleic acids, and microRNAs. Exosomes originate from multivesicular bodies (MVB), which release their contents outside the cell. These nanovesicles can fuse with the membrane of the recipient cell to pass their information. Exosomes can be used as diagnostic biomarkers since they have a broad range of macromolecules and are proper candidates to provide information about the tumor from which they were originated. Moreover, Exosomes can be used as nanocarriers to deliver therapeutics to the target cell or tissue, such as tumors. Since these nanocarriers are naturally isolated from body cells, they exert fewer side effects than synthetic nanoparticles.

Interestingly substances carried by exosomes also have therapeutic effects on some lesions. Exosomes' immunogenicity is very low, resulting in their low cytotoxicity. Since exosomes are derived from cell membranes, they are not captured by the reticuloendothelial system. Therefore, exosomes' half-life in the blood is longer compared to other nanocarriers. Also, many studies have found that exosomes can spontaneously migrate toward unhealthy tissues. Exosomes containing chemotherapy reagents or phytochemicals such as curcumin or anti-tumor miRNAs were effective in inhibiting tumor growth. To conclude, exosomes hold high promises for cancer diagnosis and therapy.

IS47 The effect of green nanoparticles on the aggregation of protein

Arezou Ghahghaei, *Department of Biology, Faculty of Science, University of Sistan and Baluchestan. E-mail:arezou@chem.usb.ac.ir*

The aggregation of proteins, including amyloid fibril formation, is the cause of many age-related diseases encompassing Alzheimer's (AD), Parkinson's (PD) and cataract. These human diseases involve the conversion of a specific protein or protein fragment from a soluble native state into insoluble amyloid fibrils that are deposited in a variety of organs and tissues. Nanoparticles interfere with protein amyloid formation and can significantly influence the nucleation and aggregation process of peptides. In this study protective ability of synthesize green nanoparticles of plant origin, using an extract derived from natural products that are powerful antioxidants, against amorphous aggregation and amyloid fibril formation of proteins are discussed. Green synthesis nanoparticles had a potential inhibitory effect on the aggregation of reduced protein in a concentration-dependent manner. This inhibitory effect of nanoparticle probably caused by decreasing the rate of fibrillation through surface absorbing of free monomeric peptides and prevents amyloid fibril formation. The surface properties of the green nanoparticle and the interaction between both nanoparticle and protein determine the potential inhibitory effect of green nanoparticles in preventing the aggregation of reduced protein. Thus, green synthesized nanoparticle as nano chaperone, can be used as a therapeutic approach in the treatment of amyloid disease such as Alzheimer disease.

Keywords: Nanoparticle; Alzheimer disease; Amyloid; chaperone

IS48 Herbal research: Important forgottens

Arezou Rezaei*- *Department of Cell and molecular biology, School of Biology, Damghan University, Damghan, Iran. E-mail: arezaei@du.ac.ir*

The Iranians were the first tribes who discovered the properties of medicinal herbs. The history of Persian medicine dates back to three thousand years ago and many centuries before Christ. The school of Zoroaster (Mazdayasna) existed long before the medical schools of Greece. The 2500-year antiquity of Simorgh is more than some medical symbols in the world and Greece.

According to Cyril Elgood, the Iranians taught the Greeks the fundamental of Greek medicine to the Greeks. Cyril Elgood and John Bernal cite the unfamiliarity with the Pahlavi or other ancient Iranian languages, and the destruction of ancient Iranian books as the reasons for the neglect of Persian medicine. It seems that the unfamiliarity and alienation with historical sources and scientific-cultural history still exist in the Iranian scientific community. The history of Iranian traditional medicine as well as Iranian endemic herbs have not been properly considered by Iranian researchers. While in modern ethnopharmacology, familiarity with historical sources is known as one of the important ways in discovering of natural-based drugs.

The safety of all herbal medicines due to their natural origin is a misconception. Biological and chemical contaminants, drug interactions, and misidentification of medicinal herbs are among the dangers associated with using herbs. However, these items, perhaps for economic reasons, are not the main subject of all herbal research. Nevertheless, there are items with impact on the validity and reproducibility of the results of herbal research and studies, such as the correct identification of medicinal herbs, scientific nomenclature, and detailed explanation of experimental methods (such as location and source of plant samples or the processing steps of herbs). These important details are also of forgotten in some publications on herbal medicines, although there is no extra cost to mentioning them. Paying more attention to the education and research of graduate students and paying attention to the above-mentioned items can have a significant impact on the international validity of herbal research.

Keywords: medicinal herbs, validity, reproducibility, scientific nomenclature

IS49 Drug Delivery Using Nanoparticles

Abbas Amer Ridha[1,2], Soheila Kashanian[3,4*], Ronak Rafipour[5]- *1 .Department of Biology, Faculty of Science, Razi University, Kermanshah, Iran 2. Iraqi Ministry of Health, Baghdad, Iraq 3. Department of Applied Chemistry, Faculty of Chemistry, Razi University, Kermanshah, Iran 4 . Nano Drug Delivery Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran 5 Department of Chemistry, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran. E-mail: Kashanian_s@yahoo.co*

Various nano-sized protein and lipid complexes are being investigated as drug delivery systems. The encapsulation of more than one drug in a single nanocomplex carrier could enhance the therapeutic potency and afford synergistic therapeutic effects. In this study, we developed a novel protein-lipid nanocomplex as a controlled drug delivery system for two important cancer drugs, doxorubicin (DOX) and mitoxantrone (MTO). Apoferritin (AFr) functionalized with folic acid (FA) was used to encapsulate DOX to create the targeted protein nanocomplexes (TPNs). The encapsulation was achieved by the disassembling of apoferritin into subunits at pH 2 followed by its reformation at pH 7.4 in the presence of the DOX drug. The second drug, MTO, was loaded into the cationic solid lipid nanoparticles (cSLN) to form the liposomal drug nanocomplex particles (MTO-cSLNs). Two complexes were then assembled by tight coupling through ionic interactions to obtain the final drug delivery system, the dual targeted protein-lipid nanocomplexes (DTPLNs). It is notable, the toxicity of the anticancer drugs can be decreased by utilizing nanocarriers and targeted drug delivery systems. UV-Vis and fluorescence spectroscopy were used for structural characterization of TPNs and DTPLNs. Transmission electron microscopy (TEM) was used for comprehensive analysis of the final DTPLNs. We confirmed that the DTPLNs display desired time-dependent and pH-dependent drug release behaviors. We also demonstrated the improved anti-cancer efficacy of DOX and MTO in their encapsulated DTPLNs as compared to their free forms. Our results provide promising prospects for application of the DTPLNs as efficient drug delivery systems.

Keywords: Apoferritin; Doxorubicin; Mitoxantrone; Cationic solid lipid nanoparticles; Dual targeting; pH-responsive

IS50 A review on history and taxonomic status of bats in Iran

Vahid Akmali- *Department of Biology, Faculty of Sciences, Razi University, Kermanshah, Iran. E-mail: v_akmali@razi.ac.ir*

Bats (order Chiroptera) are one of the most diverse, abundant and widely distributed orders of mammals and the only one with the capacity of powered flight. Nearly, 1400 species of 230 genera and 21 families can be found all over the world except in the northern and southern polar areas, representing approximately 20%of all mammalian species. Chiroptera can be divided into the two suborders Megachiroptera (old world fruit bats) are represented by only one family with 46 genera and 191 species and Microchiroptera (echolocating bats) comprise 20 families include 184 genera with 1210 species. Despite the importance of bats in providing ecosystem services as well as natural hosting reservoirs, so far the least study has been done on them compared to other mammals. Diverse physical geography and close vicinity of the Iranian plateau to the major biogeographic zones has caused this country to possess a variety of fauna unequaled in other parts of the Middle East. Bat biodiversity, like many other taxa is considerably high. Bats of Iran have been thoroughly studied since long time ago, both by Iranian and foreign zoologists. By the present taxonomic arrangement finally, 51 species of bats have been reported from Iran. These bats belonging to the families of Pteropodidae (1 species), Rhinopomatidae (3 species), Emballonuridae (2 species), Rhinolophidae (5 species), Hipposideridae (3 species), Vespertilionidae (34 species), Miniopteridae (1 species), and *Molossidae* (2 species). However, our knowledge about distribution and abundance of bats in Iran is far from adequate. For example from the 51 species of bats reported of Iran, six species have been reported only once, 17 species are known from less than 10 localities and only seven species are known from more than 50 localities. There may be further possibility to observe more bat species to occur in Iran because there are several species reported from neighboring countries in bordering areas to Iran. These species include *Rhinolophus lepidus* from Afghanistan to be seen in the northeast (Khorassan province), *Plecotus turkmenicus,* and *Rhinolophus bocharicus* from Turkmenistan to be present in similar habitats of NE and *Pipistrellus rueppellii* from Iraq to be found in western Iran. Also, *Myotis myotis* occurs in western Turkey, It's occurrence in NW Iran is possible. Only recently, intensive studies on bats have provided opportunities to make available new data on the taxonomy and ecology of bats. Future studies on bat research require much attention on involving ethical values in scientific studies, their importance in providing ecosystem services, expanding molecular studies, a survey of their viruses and their relationship to emerging diseases, re-organizing current conservation assessments, evaluating the effect of land use alternation, global warming and caves destruction on the Iranian bats, and also to enhance public attention to conservation oriented research projects.

Keywords: Mammalia, Chiroptera, Taxonomy, Conservation, Viruses and emerging diseases

IS51 Animal models in physiological studies: Challenges and prospects

Manizheh Karami*-*Department of Biology, Faculty of Basic Sciences, Shahed University Neurophysiology Research Center of Shahed University. E-mail: karami@shahed.ac.ir*

The animal model is widely used in physiology and pharmacology research. Although the use of animals in research can be an advantage for other animals, it is more useful for the advancement and improvement of human life. Even in many investigations, animal studies is considered as an introduction to clinical trials. But first of all, the use of animals as research tools requires to make a mutual relationship between humans and animals, so, ignoring safety and health and neglecting the ethical considerations of working with animals can have problematic consequences. From the past until now, these models have been divided into different groups, including experimental models, breeding and transgenic, etc., but undoubtedly any research at the beginning should have a proper reason for the use of the animal model, and the ethical and legal concerns of working with animals should be considered (such as a place for keeping and free access to water and food and many physical and environmental factors ..), which may affect the physiological and behavioral responses of the animal. The first models may have simulated part of the disease, but over time most of the key features of the diseases were replicated in the models to make them appear to be very creative and useful. However, due to limitations such as mismatching of animal and human, these models have been revised many times and with recent advances, computer simulations, and 3D printing of biocompatible materials with the help of bio 3D printer as a new

technology have replaced animal models and through eliminating the previous restrictions can be used to design and build cellular constructions and living components.

Keyword: Animal model, Ethical considerations, 3D Printer

IS52 Royan Kidney Group (RKG): Cells Therapy and Tissue Engineering in Renal and Urinary Tract Diseases: Stem cells as a new trend

Reza Moghadasali, Ph.D.- *Department of Stem Cells and Developmental Biology, Cell Science Research Center, Royan Institute for Stem Cell Biology and Technology, ACECR, Tehran, Iran.*

Kidney and urinary tract research group is one of the established groups in Royan Institute, and at present, most of its activities have focused on the administration cell therapy in patients with renal transplantation, acute and chronic renal failure and urinary incontinency. Kidney and urinary tract research group started its activities in the basic and clinical sciences by the research charity institute support from 2012. Our final goal in kidney group is to use the cell therapy as an alternative therapeutic for treatment of different renal disease. Based on this, the group's strategy has mainly focused on the following topics: 1- Development and generate of renal stem cells and differentiation of pluripotent stem cells into renal cells, 2- Create animal models of acute and chronic renal failure and transplantation of stem cells for therapeutic effects, 3- Transplantation Immunology and provided solutions for clinical studies using animal models of transplantation, 4- Understanding the mechanisms involved in the pathogenesis of polycystic kidneys to aid to the healing process of the patient and 5- Cell therapy in urinary tract diseases. Several projects have designed related to with different renal cells and their transplantation in animal models of acute and chronic renal failure. According to above goals, after equipping the non-human primate animal's lab, the model of renal failure was established in these animals as a way to study the effects of mesenchymal stem cells (MSCs) transplantation in decrease of inflammation and increase of regeneration. The results show that injection of bone marrow MSCs (BM-MSCs) as intra-renal vascular effectively reduce cisplatin-induced acute renal failure. Although our histological findings did not show significant differences between cell injected group with the control group, but it seems to reduce inflammation and prevent apoptosis through cell immune regulatory mechanisms, reducing symptoms and improving quality of life of treated animals. Also, there are also clinical trials using MSCs in acute and chronic renal failure. Differentiation of pluripotent stem cells into renal cells, is be designed for differentiation of embryonic stem cells into tubular cells. The proposal has been trying to plan the initial differentiation of pluripotent cells into renal progenitor cells. We are also trying to provide the normal kidney tissue engineering scaffolds. In this study we want to transfer of progenitor cells on acellular renal tissue scaffold of monkey kidney and evaluate the renal function with new cells. Immunomodulatory properties of mesenchymal stem cells are evaluating for kidney transplantation. The effects of immune regulation will be evaluated by transplant of different sources of mesenchymal stem cells such as bone marrow or adipose tissue in animal models. Our goal is decrease the use of immunosuppressive drugs in patients receiving kidney transplants by administration of mesenchymal stem cells. Mutation analysis of coding region in PKD1 and PKD2 genes in autosomal dominant polycystic kidney disease is other study to detect the mutations in Iranian patients with renal polycystic disease. There are also clinical trials and several projects using MSCs in animal model of polycystic kidney disease. In urinary tract diseases field, almost 30 patients have been treated in the clinical trial for evaluation of the safety and efficacy of intramuscular injection of muscle stem cells in improving incontinence and the primary results show that this method can improve the patients 'symptoms without any special complication.

IS53 Novel Cellular Strategies for Generation of Human Cardiomyocytes in Vitro

Mahmood Talkhabi*[1] – *1. Department of Animal Sciences and Marine Biology, Faculty of Life Sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran. E-mail: m_talkhabi@sbu.ac.ir*

The human heart has very limited regenerative capacity, and the low rate of carcinogenesis is not sufficient to compensate for the enormous loss of cells after injury such as myocardial infarction. Despite advances in cardiac treatment, myocardial repair remains severely limited by the lack of an appropriate source of viable cardiomyocytes (CMs) to replace damaged tissue. Human pluripotent stem cells (hPSCs), embryonic stem cells (ESCs) and induced pluripotent stem cells (iPSCs) can efficiently be differentiated into functional CMs

necessary for cell replacement therapy and other potential applications. The number of protocols that derive CMs from hPSCs has increased exponentially over the past decade following observation of the first human beating CMs. A number of highly efficient, chemical based protocols have been developed to generate human CMs (hCMs) in small-scale and large-scale suspension systems. To reduce the heterogeneity of hPSC-derived CMs, the differentiation protocols were modulated to exclusively generate atrial-, ventricular- and nodal-like CM subtypes. Recently, remarkable advances have been achieved in hCM generation including chemical-based cardiac differentiation, cardiac subtype specification, large-scale suspension culture differentiation, and development of chemically defined culture conditions. All highlight the possibility that hPSC-derived CMs may be very close to implementation in cell-based replacement therapies and other applications. Herein we review recent progress in the in vitro generation of CMs and cardiac subtypes from hPSCs and discuss their potential applications and remaining limitations.

Keywords: Heart Regeneration, Human Pluripotent Stem Cells, Direct Reprogramming, Cell Therapy

IS54 Wnt signaling in development and stem cell control

Bahman Zeynali- *Developmental and stem cell biology lab., School of Biology, College of Science, University of Tehran.*

The Wnt signaling pathway is one of the central signaling pathways regulating early vertebrate development. The role of this signaling pathway on the specification of embryonic axes, especially in *Xenopus* embryo, is well documented. In recent years, it has become clear that the Wnt pathway also regulate many aspects of stem cell behavior and adult tissue homeostasis. Since stem cells are an ideal candidate for cell therapy, it is important to identify the signaling network that controls the activity of these cells. Our recent works have shown that activation of Wnt/β-catenin signaling pathway in adipose tissue-derived mesenchymal stem cells (AD-MSCs) resulted in a decrease in bone matrix synthesis and expression of osteogenic specific genes in these cells. Moreover, while the expression of *BMP* and its target gene (*ID3*) was decreased, the expression of BMP antagonist, *Noggin*, was significantly increased in Wnt activated AD-MSCs. Altogether, our recent results suggest that activation of Wnt signaling in osteogenic induced AD-MSCs inhibits osteogenic differentiation through inducing the expression of BMP antagonist. These results provide further insight into the role of Wnt signaling in stem cell differentiation.

Key words: Mesenchymal stem cells, Wnt signaling pathway, osteogenic differentiation

IS55 Wolbachia in scale insects: A unique pattern of infection prevalence, high genetic diversity, and host shifts

Ehsan Sanaei- *School of Biological Sciences, The University of Queensland, Saint Lucia, Brisbane, QLD, 4067 Australia. E-mail: e.sanaei@uq.net.au*

Wolbachia is one of the most successful endosymbiotic bacteria of arthropods. It is a master manipulator, modifying its hosts' biology in many ways to increase its vertical (maternal) transmission. Wolbachia can also undergo host shifts that can be mediated by ecological vectors such as shared host plants or parasitoids. Here, I screened 687 specimens from 151 scale insect species that were mostly collected in Asia and Australia for Wolbachia infection. I fitted the distribution of within-species prevalence of Wolbachia to our data and compared it to distributions fitted to an up-to-date dataset compiled from surveys across all arthropods. In contrast to other hemipteran groups, the prevalence of Wolbachia in scale insects follows a distribution similar to exponential decline (most species are predicted to have low prevalence infections). By conducting Illumina pooled amplicon sequencing of 59 infected scale insect samples and 16 direct associates of scale insects (including wasps and ants), I determined 63 Wolbachia strains in these species belonging to supergroup A, B and F. I observed a lack of congruency between Wolbachia and scale insect phylogeny and identified several putative host-shifts events. Finally, I fitted a Generalised Additive Mixed Model (GAMM) to assess factors influencing Wolbachia sharing among scale insect species. I found strong effects of host phylogeny without any significant contribution of host geography. There were high rates of Wolbachia sharing among closely related species (i.e., host-shifting mostly happens between species of the same genus) with a sudden drop-off in sharing with increasing phylogenetic distance. This finding can explain a large number of reported Wolbachia host-shifting among congeneric species.

IS56 Molecular data proves successful in resolving taxonomy, phylogeny and biogeography of Pompilidae (hymenoptera)

Mahin Chavoshi- *Juanita Rodriguez ANU, CSIRO. E-mail: mahin.chavoshi.jolfaei@anu.edu.au*

During recent years, using molecular data for taxonomic questions has proved successful. Pompilids are difficult hymenopteran group that are understudied in Australia. Here we used a combined dataset of Mitochondrial, nuclear and UCE markers to delineate two closely related genera of Heterodontony and Cryptocheilus. We also used DNA data for species delimitation and biogeography reconstruction. The results suggest that Heterodontonyx distribution is mainly limited to Australia whereas Cryptocheilus is distributed in Palearctic, nearctic, Africa and Oriental region. Three new potential species discovered using PTP and bPTP plus BioGeoBEARS analysis suggest that Australian species may have oriental origin.

Keywords: Pompilid phylogeny

IS57 Mass production of live food and their by-products in semi-arid areas

Alireza Sari- *School of Biological Sciences, University of Tehran. E-mail: sari@ut.ac.ir*

The semi-arid area possesses several key factors such as sun light, suitable temperature, nutrient rich soil, saline or brackish water, land availability which make it candidate for certain organisms biomass production. In this talk, production of unicellular algae, Rotifer, some crustacean, insect and fish will be discussed. The priority is given to job enhancements for local community using traditional experiences and advanced methods in closed culture systems. The advantages of using locally available species greatly help the sustainable use of resources and their conservation in the nature. In addition, due to unique adaptation of species, there is an opportunity to establish a Bio-Bank for genetic and natural resources. Apart from biomass production, the by-products of these farms are used in pharmaceutical and medicinal industries and green fuel production.

As an example, some comparative added values to land use, level of biomass production and economical investments from other countries achievements are given.

IS58 A review on the effects of the herbal active molecules, pectins and flavonoids on the mammary gland epithelial cells and cancer cell; targeting these cell in cancer cells

Houri Sepehri- *School of Biology, College of Sciences, University of Tehran E-mail: hsepehri@ut.ac.ir*

Human History always was related to the use of herbal medicine which was the main treatment of diseases. Chemical drugs applying became popular along with developing science and industry. As such drugs contained side effects, using herbal medicine resume.

There are two kinds of herbal effective substances: the first one is the primary metabolic substances such as polysaccharides (pectins). The other is the secondary metabolic substances as flavonoids.

We assessed the effects of these herbal effective molecules on cancerous and healthy cells. The polysaccharides (pectins) were studied on GH3/B6 cells which are capable of secret Prolactin and Growth Hormone. The data were shown the effect of pectins on these cells.

In the second group, we studied the flavonoid named Salvigenin. In cancer cells, Salvigenin could link to P53 following cycling-CDK linkage to inhibit the cell cycle in G,M and S phase. In such conditions, P53 plays an apoptotic role while it plays an anti-apoptotic role in normal cells. Our results declared that salvigenin accompany magnetic nano-particles promoted the apoptotic effects of this molecule alone. It is worth mentioning that such effects were not seen in normal cells. The PLGA synthetic polymer with sedimentation method used to prepare Fe3O3@mPEG-b-PLGA.

IS59 The effect of Mouse Embryonic Stem Cells (mESCs) transplantation on ischemic tolerance in animal stroke model

Mahmoud Ramdan[1], Mohammad Reza Bigdeli[1, 2]*, Sanaz Nasoohi[3], Salma Ahmadloo[4]- *1. Department of Animal Sciences and Biotechnology, Faculty of Life Sciences and Biotechnology, Shahid Beheshti University 2. Inistitute for Cognitive and Brain Science, Shahid Beheshti University 3. Neuroscience Research Center, Shahid Beheshti University of Medical Sciences 4Vaccination Department, Pasture institute of Iran E-mail: bigdelimohammadreza@yahoo.com*

The number of people affected annually by stroke, actually over 2 million worldwide. This is because of the increase in the mean population age, the persistence of unhealthy habits, and the emerging risk factors that will affect young patients particularly. The previous studies have shown that cell transplantation can improve neurological function after cerebral ischemia and therefore extend the therapeutic time window for intervention. The development of stem cell-based therapies for cerebral ischemia aims to replace lost neurons and/or to prevent cell death. Embryonic Stem Cells (ESCs) are a good source for cell therapy and regenerative medicine. Mouse Embryonic Stem Cells (mESCs) possess stem cell properties, can be cultured in abundance in vitro and contains an inexhaustible, noncontroversial source of stem cells for therapy. 35 adult male rats weighing between 300-250 grams were used. The rats were divided into 3 groups. Control, sham and Mouse Embryonic Stem Cells (mESCs) transplantion-recipived groups. Rats of Mouse Embryonic Stem Cells (mESCs) transplantion-recipived were divided into 2 categories for evaluation of infarct volume and neurological deficit scores. In the control group, only the effect of cerebral ischemia surgery and in the sham group, the effect of injection of Mouse Embryonic Stem Cells medium (non-ischemic and transplantation) were evaluated. In the control and Mouse Embryonic Stem Cells (mESCs) transplantion-recipived groups, the rats were subjected to 60 min of right middle cerebral artery occlusion (MCAO). In the present study, Mouse Embryonic Stem Cells (mESCs) were transplanted into right rat's striatum by using stereotaxic surgery. After 7 days pretreatment, the rats were subjected to 60 min of right middle cerebral artery occlusion (MCAO). After 24 h ischemia induction, neurological deficit scores (NDS) and infarct volume (IV) in total, cortex, piriform cortex-amygdala, and striatum areas of hemisphere were assessed. In this study, a significant reduction in neurological defects was observed in the Mouse Embryonic Stem Cells (mESCs) transplantion-recipived compared to the control group. The volume of infarction was significantly lower in the Mouse Embryonic Stem Cells (mESCs) transplantion-recipived group compared to the control group in the striatum, cortex and piriform cortex-amygdala. For the first time, the present results indicate that transplantation of Mouse Embryonic Stem Cells (mESCs) before ischemia induction resulted in a significant reduction in NDS and IV, in comparison with the control group. Our study showed that Mouse Embryonic Stem Cells (mESCs) can protect neural cells against undesirable impacts of cerebral ischemia. It seems that Mouse Embryonic Stem Cells (mESCs) due to exerts decremental effect on ischemic damages.

Keywords: Cerebral Ischemia; Embryonic Stem Cells (ESCs); middle cerebral artery occlusion (MCAO); Infarct volume (IV); Neurological Deficits.

IS60 Cerebral folate and cerebrospinal fluid: essential components of normal brain development

Jaleel Miyan- *Senior Lecturer Faculty of Biology Medicine & Health Division of Neuroscience & Experimental Psychology The University of Manchester E-mail:j.miyan@manchester.ac.uk*

The cerebrospinal fluid (CSF) system has been largely ignored as a physiological fluid of any importance. However, CSF is made specifically for the cerebral cortex from the initiation of cortical development and its production continues throughout life. CSF has been shown to be a growth medium for brain stem cells and has also been shown to be essential to normal migration of cells as the cortex develops. Many conditions of poor brain development and neuropsychiatric conditions have been associated with abnormalities in the fluid system and hydrocephalus, the extreme of these, has been shown to dramatically affect cerebral folate supply. In this talk I will present evidence for the critical role of CSF and cerebral folate in the development of the cerebral cortex and how this can go wrong

in the aetiology of some neurological conditions. Addressing this specific cerebral folate issue, which is independent of folate status in the rest of the body, can prevent or treat such conditions.

IS61 Novel strategy for reduction of morphine dose in pain relief: the underlying mechanisms

Sakineh Alijanpour- *Dept. of Biology, College of Science, Gonbad Kavous University, Gonbad Kavous, Iran*

Pain, an unpleasant sensory and emotional experience, is a wide prevalence syndrome impairing different aspect of patient's life quality and associated with the economic and sociality burden. Morphine is one of the most well-known and potent analgesic agents for treatment of acute or chronic pain; however, it can also induce various side effects. Thus, finding new treatment and mechanisms for pain management as well as drugs which potentiate the analgesic effects of low doses of morphine and reduce its side effect will be good strategies. Nociceptors transmit information about noxious stimuli from mechanical, thermal, and chemical sources to the central nervous system and higher brain centers via electrical signals. Nociceptors express various channels and receptors including voltage-gated sodium channels (VGSCs), voltage-gated sodium channels (VGCCs), transient receptor potential channels (TRP channels) and NMDA receptors which inhibition or alteration of these pain targets can attenuate the pain response. The other potential new targets for pain relief are miRNA replacement therapy and nanomedicine approach. Also, combining a suboptimal dose of morphine with another drug providing additive analgesic effects with less side effect will be useful method for pain management. The molecular players in the above mentioned approaches are diverse and complex. Thus, it can be concluded that the future of pharmacological pain therapies will be multidirectional.

Key words: Pain relief; Morphine; Side effect; Nociceptors

IS62 Investigation of the effect of point mutations on human transthyretin protein structure and aggregation

Seyyed Abolghasem Ghadami[1*], Kimia Ahadi Amandi[1] - *1 Department of Biotechnology, Faculty of Biological Sciences, Alzahra University, Tehran, Iran E-mail: a.ghadami@alzahra.ac.ir*

In cell proteins will be synthesized away the nascent chain to folded state. For almost all proteins, based on appropriate conditions, there would be an aggregated state, generally called amyloid can lead to neurodegenerative diseases such as Alzheimer's and Parkinson's diseases. Generally, aggregations causing these pathological conditions are initiated from intrinsic disorders (e.g., mutations). Transthyretin, a tetrameric transporter protein that in its monomeric form can self-associate to shape amyloid-beta aggregation is one of these proteins. All the point-mutations that can expose buried hydrophobic region, unstable tetrameric formation, and ultimately cause aggregation can lead to pathological conditions such as Transthyretin amyloidosis disorders or transthyretin amyloid cardiomyopathy (TAC). This study focuses on producing and isolating recombinant human transthyretin in *E.Coli* by making specific amino acid alternation via site-directed mutagenesis. To evaluate protein structure and aggregation, some techniques such as turbidity, mass spectrometry, dynamic light scattering (DLS), fluorescence, circular dichroism (CD), and X-ray crystallography have been widely used. Results show that a W41F protein mutation in transthyretin leads to intense instability and amyloid fibril accelerated formation. In contrast, W79F protein mutation shows no sensible structure or stability alternation. Changes in protein sequence and structure can affect properties such as hydrophobicity, secondary structure propensity, and charge. These changes in the way of increasing the hydrophobicity or polypeptide propensity to convert from alpha-helix to beta-sheet and decreasing the total surface net charge of protein can increase the aggregation propensity.

Keywords: Amyloid-β, Protein folding, Neurodegenerative diseases, Transthyretin, Intrinsic disorders

ORAL PRESENTATIONS

PO1 Effect of altitude level on photosynthetic parameters and chlorophyll pigments of *Amygdalus haussknechtii* L.

Ali Parvizi[1], Ali Asghar Hatamnia[1]*, Nayer Mohammadkhani[2], Hamid Reza Naji[3] -*1. Department of Biology, Ilam University, Ilam, Iran 2. Shahid Bakeri High Education Center of Miandoab, Urmia University, Urmia, Iran 3. Department of Forest Sciences, Ilam Universit, Ilam, Iran. E-mail: a.hatamnia@ilam.ac.ir*

Amygdalus haussknechtii L. belong of the Rosaceae family that is distributed in large areas of Iran. In natural ecosystems, various factors such as altitude level affected the plants photosynthesis. Therefore, the aim of this study was to investigate the effect of altitude level on photosynthesis and chlorophyll pigments in *A. haussknechtii* L. Photosynthesis parameters (net photosynthesis and transpiration) were measured using a portable photosynthesis device from *A. haussknechtii* L. at three different altitude level of Qalajeh mountain in Ilam province. Also, content of chlorophyll a, chlorophyll b, total chlorophyll and carotenoids were also measured. The results shown that with increasing altitude, the rate of net photosynthesis and transpiration decreased. Also, the content of chlorophyll a, chlorophyll b and total chlorophyll pigments decreased with increasing altitude. There are a significant positive correlation ($p<1$) was observed between photosynthetic parameters (net photosynthesis and transpiration) and chlorophyll a, chlorophyll b and total chlorophyll pigments. However, unlike other photosynthetic pigments with increasing altitude the content of carotenoids has increased, which is actually a response to environmental stress. In general, increasing the altitude causes environmental stresses of the plants condition, including low temperature and soil drying, which resulting rate of photosynthesis and plant growth has decreased.

Keywords: Net Photosynthesis, Transpiration, Carotenoids, Stress

PO2 Genome-wide of identification of calcium sensor gene family in *Aeluropus littoralis* (Gouan) Parl.

Mozhdeh Arab[1], Hamid Najafi Zarrini[1], Ghorbanali Nematzadeh[2], Seyyed Hamidreza Hashemipetroudi[2*] -*1. Department of Biotechnology and Plant Breeding, Sari Agricultural Sciences and Natural Resources University (SANRU), 2. Department of Genetic Engineering and Biology, Genetics and Agricultural Biotechnology Institute of Tabarestan (GABIT), Sari Agricultural Sciences and Natural Resources University (SANRU). E-mail: shr.hashemi@sanru.ac.ir; irahamidreza@yahoo.com*

During the evolution, plants have evolved a series of complex and highly regulated signal transduction pathways to respond to adverse environmental conditions. Calcium signaling, as a vital mechanism, enables plants to respond to various external stimuli and to coordinate basic cell processes. In the present study, by comprehensive analysis of the gene family of calcium sensors in the halophyte plant *A. littoralis*, 21 CIPK genes and 16 CDPK genes were identified, and analysis of subcellular localization showed that these proteins are active in different cell compartment. The phylogenetic tree indicated that the *AlCIPK* and *AlCDPK* gene family had high homology to monocotyledon and cereals plants such as sorghum, foxtail millet and rice. Gene structure and motif composition revealed that these genes were relatively conservative in each subfamily. RNA-seq analysis of *AlCIPK* and *AlCDPK* gene family members under salinity stress in both root and shoot tissues showed that *AlCDPK5* gene had the lowest expression in both tissues, *AlCDPK24* and *AlCDPK28* had the highest expression level in shoot and root, respectively, and finally *AlCIPK10* and *AlCIPK1* genes had the lowest and highest expression in root and shoot, respectively. The distinctive expression patterns of *AlCIPK* and *AlCDPK* gene family members confirmed the functional and structural convergent of these genes. The findings of this study reveal the functional characteristics of the calcium gene family and provide basic information for future research on their biological functions.

Keywords: Expression analysis, Gene family, CDPK, CIPK, halophyte

PO3 Investigation of biodiversity and frequency of diatoms and their relationship with water quality in the River Ahar chay, NW-Iran

Zahra Yadollahi[1*], Ehsan Atazadeh[2] -*1. Student in Plant Biology, Faculty of Natural Sciences, University of Tabriz, Iran, 2. Assistant Professor, Department of Plant Biology, Faculty of Natural Sciences, University of Tabriz, Iran. E-mail: zara.yadollahi@gmail.com*

Algae are one the most important bio-indicators for evaluation of water quality in rivers and wetlands. Diatoms (Bacillariophyaceae) are unicellular eukaryotic algae. Having the frustule is one the important characteristics in this group of the algae. Diatoms are living in freshwater and brackish water, where their

growth and development are affected by water chemistry and quality (temperature, salinity, habitat, light, …). This study was focused on the diatom flora of the River Ahar chay and the effects of the ecological factors on biodiversity and frequency. In order to study, the samples were collected in 6 sites during four different seasons in 2019-2020. In this study, physicochemical factors such as PH, DO, EC were measured. After the transferring the samples to the laboratory, the samples were digested using H_2O_2 and HCl. Then, standard slides were prepared using Naphrax glue. Diatoms were identified using light microscope and diatom flora. Moreover, the frequency of the diatom community was measured. This investigation showed that species such as *Surirella angusta*, *Nitzschia dissipata*, *Rhoicosphenia abbreviate* were dominant whilst in downstream of the river species such *Gomphonema truncatum*, *Nitzschia palea*, *Cyclotella meneghinina* were dominant .The data used to calculate the Trophic Diatom Index and the results showed that the up-stream of the river is in good ecological status whilst the down -stream of the river is in mediate to poor conditions.

Keywords: Diatom, EC, DO, frustule, Bacillariophyaceae, River Ahar chay, Ecology

PO4 Investigation and study of algal flora (Bacillariophyta)in Gorigol Wetland)

Zhaleh Behrozi Baraghi[1]*, Ehsan Atazadeh[2] -*1. Tabriz - Tabriz University Natural Sciens Faculty plant physiology 2. Tabriz - Tabriz University Natural Sciens Faculty plant Ecology group. E-mail: behrozi.zh@gmail.com*

Diatoms are one of the main component in our biometric studies in order to determine the ecological quality of water. They are the most important fundamental flora diatoms of freshwater ecosystems. Identification of diatomaceous flora and the precise study of their demographic changes in Ghorigol Wetland that is one of the most important area which is located in the Northwest of East Azerbaijan province. Sampling was done from July 2019 to April 2020, from 5 stations. This region has real worth of biodiversity in terms of the sensitive environmental situation of the Urmia Lake and has a global important. In this study, 112 species of diatoms were identified, which belonged to 37 genera, 20 dark Diatoms, 13 ordered Diatoms and 1 lined (classified) which belong to 2 branches of (Bacillariophyta and Ochrophyta). To interpret the effect of different factors the cluster analysis was performed by using Canoco software and editing image was performed by using ACDsee software. There is a relationship between the temperature of environment , pH, BOD, EC and the variety and number of diatoms. Physicochemical factors such as TP, PH DO, EC, BOD, COD, and content of heavy metals as Fe and Cu affecting biodiversity and the number of diatom species in this lagoon. Despite the low amount of dissolved oxygen in the water of the lagoon area, its high fluoriatomic diversity is really important in all seasons, especially in spring and autumn. In order to evaluate the frequency better they try to use the counting method of Diatoms. Another important and significant point in this study is the lack of morphological change in their siliceous crust, which cause their deformation in the presence of any contamination, especially with heavy metals, which was not observed in any of the 5 station samples.work, and conclusions drawn along with recommendations for further works. Using headings for abstract body text is not required.

Keywords: Gorigol, Cluster Analysis, Physicochemical Changes

PO5 The latest checklist of Iranian *Pyrus* L. (Rosaceae) taxa

Asghar Zamani - *Department of Biology, Faculty of Science, University of Guilan, Rasht, Iran. E-mail: a.zamani@guilan.ac.ir*

In this paper, the latest checklist of Iranian taxa of the genus *Pyrus* L. is presented. Pear as a tree to shrubby member of subtribe Pyrinae, subfamily Spiraeoideae family Rosaceae, comprises of about 22-75 species in the northern hemisphere and some parts of northwestern tip of Africa, except for North America. According to the latest information from the flora of Iran, 25 taxa (including two hybrids) of the genus occur in Iran. Geographically, pears in Iran are distributed especially in transition zones between Irano-Turanian and Hyrcanian provinces in Elburz mts. from northeast to northwest, scrublands and dry slopes of northeast, dense forests and open forests of northwest (Arasbaran area) and within the *Quercus* woodlands of Zagros mts. throughout northwest to southwest. The main morphological diagnostic characters in *Pyrus* consist of shape of leaf, fruit, indumentum and leaf margin shape, presence of calyx and lenticels on the mature fruit. These taxa are classified as the members of four sections, viz. *Pyrus* (*P. grossheimii*, *P. hyrcana*, *P. communis*, *P. farsistanica*, *P. turcomanica*, *P. tamamschianae*, *P. mazanderanica*), *Pashia* (*P. boissieriana*,

P. pashia, *P. kandevanica*, *P. gharemanii*, *P. longipedicellata*, *P. cordifolia*), *Argyromalon* (*P. salicifolia* var. *salicifolia*, *P. salicifolia* var. *serrulata*, *P. elaeagnifolia*, *P. theodorovii* var. *latifolia*) and *Xeropyrenia* (*P. syriaca*, *P. oxyprion*, *P. glabra*, *P. spinosa*, *P. zangezura*, *P. giffanica*). The hybrid taxa include *P.* × *takhtadzhianii* and *P.* × *medvedevii*.

Keywords: Flora, Phenology, Phythogeography, Systematics

PO6 Isolation and identification of secondary methabolites Using GC-MS analysis of chloroform-methanolic extracts of fruits in *Heracleum persicum* Desf Ex Fischer

Mohammadreza Heidari, Kazem Mahdigholi*, Sedigheh Ahmadi-Sakha, Mohsen Falahati-Anbaran - *Department of Plant Sciences, School of Biology, College of Science, University of Tehran, Tehran, Iran. E-mail: kmahdigholi@ut.ac.ir*

Golpar, *Heracleum persicum* Desf Ex Fischer (Apiaceae) is one of important medicinal plants which to Iran. The fruits of this plant are widely used as spices and flavorings agents in foods as well as traditional herbal medicines for soothing, disinfecting, improving digestion and analgesia. In this study, in order to investigate the natural variation in the level of secondary metabolites was investigated quantitatively and qualitatively using GC-MS analysis of chloroform-methanolic extract of fruits from 7 populations in Tehran (Tangeh-savashi, Shemshak), Ardabil (Anbaran), West Azerbaijan (Movana, Rezi(Ghotor), Silvana) and East Azerbaijan (Sambran). A total of 97 compounds were identified in all population, in which 11 compounds including γ-sitosterol (0.8 - 7.86), squalene (0.29 - 0.82), oleic acid (1.61 - 4.10), pimpinellin (3.93 - 14.59), hexadecanoic acid (0.82 - 7.71), n-octyl 2-methylbutyrate (2.23 - 7.95), hexyl hexanoate (2.14 - 5.46), octyl 2-methylpropanoate (1.27 - 9.44), pentylcyclopropane (11.01 - 18.98), hexyl butyrate (19.03 - 33.71), 2-methylhexyl propanoate (1.68 - 3.81) were commonly reported in all populations. The amount of major compounds varied from 64 to 80% in Movana and Tangeh-savashi respectively. Although the content and amount of secondary metabolites identified with chloroform-methanolic extract is different from that detected with distillation method, But hexyl butyrate and several others common compounds is detected at high level in both methods. The results show that *Heracleum* fruits have might have medicinal and cosmetic values. Some of variation in the level of compounds among populations could probably be explained by environment conditions.

Keywords: golpar *Heracleum*, chloroform-methanolic extract, GC-MS, secondary metabolites

PO7 Trichome morphology of the tribe Pogostemoneae (Lamioideae; Lamiaceae)

Atefeh Babaei[1], Yasaman Salmaki[1*] -*1. Department of Plant Science and Center of Excellence in Phylogeny of Living Organisms, School of Biology, College of Science, University of Tehran, Tehran, Iran. E-mail: ysalmaki@ut.ac.ir*

The Pogostemoneae taxa are characterized by having posterior lip often short, stamens often long exserted, filaments often bearded and nutlets often small. A comprehensive investigation of the trichome morphology of tribe Pogostemoneae was studied to determine the usefulness of these characteristics for systematic purposes. We have investigated the distribution and morphology of trichomes of stems, leaves, and calyces in 10 taxa of 9 genera of Pogostemoneae using light microscopy and Scanning Electron Microscopy. Two basic types of trichomes can be distinguished: non-glandular and glandular. The non-glandular trichomes can be subdivided into subtypes: simple (i.e. short, long, and extremely long trichomes) and branched. Capitate trichome (that subdivide to sessile, short-stalked, and stalked) and peltate constitute two subtypes of glandular trichomes. Simple short non-glandular and sessile glandular trichomes are the most common types of trichomes in the tribe. *Leucosceptrum*, *Rostrinucula*, and *Comanthosphace* are characterized by branched trichomes. Peltate trichomes were observed only in *Pogostemon benghalensis* among all the species that were studied. Our results showed that the presence or absence of trichomes and types of them are important morphological traits and can be considered as diagnostic properties in the Pogostemoneae tribe.

Keywords: Classification, Pogostemoneae, Taxonomy, Trichome morphology

PO8 Genetic diversity and population structure of *Trifolium resupinatum* L. using CDDP method

Maryam Haerinasab[1*], Mohsen Tajarrob[1], Atena Eslami-Farouji[1] -*1. Department of Biology, Payame Noor University, PO BOX 19395-4697, Tehran, Iran. E-mail: m.haerinasab@pnu.ac.ir*

Trifolium resupinatum L. (Fabaceae) is a cosmopolitan plant and one of the most remarkable resources for grazing, nitrogen fixation, and also soil texture improvement in natural environments. Various molecular markers evaluated the genetic variation and remaining genetic parameters of different taxa worldwide. Accordingly, the current study supposed to check the capability of CDDP method to exhibit the genetic variation and polymorphism of *Trifolium resupinatum* cultivars throughout Iran, and thus the number of 15 cultivars were collected. In our case, DNA was extracted using modified CTAB methodology. A total of 243 scoreable bands were generated based on 20 primers. High level of polymorphism (94.65%) was revealed within the studied cultivars. WRKY-R1 indicated the lowest polymorphism, while WRKY-R1, ABP1-1, WRKY-F1 and ERF3 genetic primers were displayed the highest variation. Unweighted pair group method with arithmetic mean (UPGMA) cluster analysis and Principle coordinate analysis (PCoA) was constructed based on Horn coefficient similarity using PAST software. The number of population structures (K) was detected by STRUCTURE and STRUCTURE harvester. The number of clusters was determined two, and the cultivars belonging to south indicated more similarity and classified into the same group. PCoA result was also in agreement with UPGMA cluster analysis.

Keywords: Biodiversity, Cultivar, Persian clover, Polymorphism, Population structure

PO9 Effect of salinity stress on some physiological and phytochemical properties of oregano (*Origanum vulgare* L. ssp. *vulgare*)

Zahra Azimzadeh[1], Abbas Hassani[2*], Babak Abdollahi Mandoulakani[3], Ebrahim Sepehr[4] - *1, 2. Department of Horticultural Science, 3. Department of Plant Production and Genetics, 4. Department of Soil Science, Faculty of Agriculture, Urmia University. E-mail: a.hassani@urmia.ac.ir*

Oregano (*Origanum vulgare* L.) is a perennial herbaceous plant belonging to the Lamiaceae family which has many uses in folk medicine and pharmaceutical, food and cosmetics industries. Oregano has antibacterial, antifungal, antiviral and antioxidant properties due to its biologically active compounds such as phenols. Iran is located in arid and semi-arid region, so the soil and irrigation water salinity has become a major challenge in the country. Since the biosynthesis of secondary metabolites is strongly affected by environmental stresses such as salinity, so this study was conducted to investigate the effect of salinity stress on physiological and phytochemical characteristics of oregano in a completely randomized design with three replications. The experimental treatments included salinity stress induced by sodium chloride at four levels (0, 25, 50 and 100 mM) which were applied until flowering stage. The results showed that chlorophyll content (SPAD) decreased but proline and total phenol content and antioxidant activity of leaves increased as the salinity stress intensified. Furthermore, the lowest level of salt stress (25 mM) increased the essential oil content and total soluble sugars. According to the results of this study, it can be concluded that the cultivation of oregano in soils with moderate salinity can be important due to the increase of its secondary metabolites.

Keywords: Antioxidant activity, Chlorophyll, Essential oil content, NaCl salinity, Proline

PO10 Chromosome number report and karyotype analysis of *S. litwinowii* (Caryophyllaceae)

Abbas Gholipour[1], Fatemeh Abbaszade[2], Dawood Zakeri[3] -*1. Associated professor, Payame Noor University, Tehran, Iran, 2. MSc graduated of plant development biology, Payame Noor University, Tehran, Iran, 3. MSc of desertification combating, Isfahan University of Technology, Isfahan, Iran. E-mail: Abbas.gholipuor@gmail.com*

The genus *Silene* including about 24 species in Khorasan (NE Iran) of which 3 species are endemic of this province. *Silene litwinowii* is an interesting species with very restricted distribution in Khorasn province. There is no information about chromosome number and karyotype features of the species. Therefore, the aim of this research is karyotype analysis of *S. liwinowii*. The Maturated seeds was collected from natural habitat of the species in Khorasan province. For karyotype study, freshly grown roots tips was pretreated

for 3 hours in 8-hydroxy quinolone and then fixed in carnoy solution for 24 hours. After hydrolysis, staining with aceto-orsein and Squash, the well-prepared metaphase plates was photographed by digital camera. Karyotype features of this species including chromosomal formula, karyotype symmetry, A1, A2, TF% coefficients and the largest to smallest chromosome ratio were calculated. As a results the chromosome number of the species was recognized to be 2n=2x=24 and reported for the first time. The Stebbins's asymmetry class, A1 asymmetry index, TF% index and L/S were determined to be 2A, 0.94, 40.91 and 2.81 respectively. The karyotype formula of this species consists of 10 submetacentric (m) and 2 Metacentric (M) chromosomes. According to the results of the present study, this species has a relatively symmetrical karyotype.

Keywords: *Silene*, chromosome number, Caryophyllaceae, karyotype, Khorasan

PO11 Proteomics of wheat exposed to nano-pesticide

Mahdi Alizadeh[1], Ali Bandehagh[1*], Aziz Sheikhi-Garjan[2], Leila Ma'mani[3], Ghasem Hosseini Salekdeh[3], Kambiz Gilany[4], Mehdi Amini[4], Elham Sarhadi[5], Alireza Ghassempour[6*] -*1. Department of Plant Breeding and Biotechnology, University of Tabriz, Tabriz 51666-16471, Iran 2. Iranian Research Institute of Plant Protection, Tehran, Iran; 3. Agricultural Biotechnology Research Institute of Iran (ABRII), Karaj, Iran; 4. Reproductive Biotechnology Research Center, Avicenna Research Institute, ACECR, Tehran, Iran; 5. Department of Biotechnology, Research Institute of Forests and Rangelands, Tehran, Iran; 6. Medicinal Plants and Drug Research Institute, Shahid Beheshti University, Tehran, Iran. E-mail: bandehhagh@tabrizu.ac.ir; a-ghassempour@sbu.ac.ir*

One benefit of nanotechnology in the biosciences is controlled release of pesticides .The proteomic study is also one of the novel approaches in toxicology, biosafety assessment, and identification of plant molecular behavior that interacts with recent insecticides. Whereas *Eurygaster integriceps* is the most critical pest of wheat and barley fields, which causes damage in several stages; aiming to deal with it through nano-encapsulation technology, the proteomics of plants affected by this pest and the designed nano-formula was performed. Two-dimensional electrophoresis was executed after extracting the total protein content from the leaf tissue of treatments (control, smeared with nanocarrier and nanopesticide) that were affected by overwintering adult insects. After differential analysis of gels spots, with the criterion of increasing expression (IF≥2) or decreasing expression (IF≤0.5) and the adjusted p-value of 0.05, six proteins by comparing nanocarrier-nanopesticide profiles, and 20 joint proteins by matching nanocarrier-control and nanopesticide-control gels were selected; and then identified using tryptic in-gel digestion, MALDI-TOF mass spectrometry, and bioinformatics databanks. The biggest differences were in chloroplastic proteins; the proteins associated with the large Rubisco subunits had increased and decreased expression in the separate comparison of the nanocarrier and nanopesticide with control and nanocarrier relative to nanopesticide, respectively. The expression of nuclear proteins involved in the production of transcription factors and cell differentiation in nanocarrier was increased compared to nanopesticide. Role-playing cytoplasmic proteins in the cell division and lignocellulosic biomass formation in nanocarrier also had an increased expression compared to nanopesticide; therefore, the plant likely plans to accelerate physiological development and to have different modulated mechanisms in interaction with simultaneous biotic and abiotic stressors to response the pest or avoid pesticide phytotoxicity. The convergence of sciences, in addition to promoting an understanding of biological interactions, can be used to better and safer new products.

Keywords: Leaf proteome, Sunn-pest, Nano-encapsulated pesticide

PO13 Regeneration of *Stevia rebaudiana* Bertoni plant in somatic embryogenesis using Multi-walled Carbon Nanotube

Marziyeh Asad [1], Abdolkarim Chehregani Rad [1], Fariba Mohsenzadeh [1], Mahsa Aminsalehi [1*] - *1. Department of Biology, Faculty of Sciences, Bu-Ali Sina University, Hamedan, Iran. E-mail: A.mahsa@sci.bascu.ac.ir*

Stevia rebaudiana (Bert.) belonging Asteraceae family is one of the most important medicinal plants. Due to the incompatibility of the plant, somatic embryogenesis is valuable. Nowadays, carbon nanotubes (CNTs) can give new possibilities for modern applications in the field of biotechnology and agriculture. In the study, embryogenesis and the possible impact of MWCNTs on embryogenesis have been investigated. Observations and results indicate that the combination and hormonal concentration used is very important.

The highest rate of embryogenesis in light was observed at 1 mg l^{-1} 2,4-D with 0.2 mg L^{-1} kin and BA hormones in callus, and the highest rate of embryogenesis in light was observed in dark at 1 and 2 mg L^{-1} 2,4-D hormone with 0.2 mg l-1 kin in callus. Also, the data indicated that MWCNTs had a positive effect on the fresh and dry weight of calluses and the highest fresh and dry weight observed in 500 µg l^{-1} treated group. while, it had a negative effect on the rate of embryogenesis, and in MWCNTs -treated groups, decreased compared to the control, and causing cell death. In this research, as in previous studies, it was found that, duration and particle size of used MWCNTs, and as well as the stage of plant growth, the main cause and decisive in creating phytotoxicity, or positive of MWCNTs on growth, callus formation and embryogenesis in plants.

Keywords: Asteraceae family, Callus, somatic embryogenesis, Carbon Nanotube, Tissue Culture

PO14 Genome size variation in the succulent plant family Crassulaceae

Arezoo Dastpak*[1,2], Ilia J. Leitch[2], Robyn F. Powell[2], Sahr Mian[2], Paul Rees[2] -*1. Department of Biology, Central Tehran Branch, Islamic Azad University, Tehran, Iran, 2. Department of Comparative Plant and Fungal Biology, Royal Botanic Gardens, Kew TW9 3DS, UK. E-mail: arezoo.dastpak@iauctb.ac.ir, A.dastpak@kew.org*

Genome size (GS) refers to the total amount of DNA in the unreplicated gametic nucleus (i.e. the 1C-value). GS can have an impact at different biological scales, from the genomic level to the whole-plant level, impacting evolutionary and ecosystem dynamics.In land plants, genome sizes exhibit an extreme diversity, ranging ca.2,400-fold (0.063-152.3pg/1C).The underpinning causes of such diversity vary between species but are likely to be reflect the relative balance between genomic processes (e.g. dynamics of repetitive DNA and polyploidy) and abiotic factors which may provide an environmental filter, excluding species with large genomes from certain habitats as a result of the negative relationship of genome size with cell size and cell-cycle times.This study aims to undertake a survey of GS diversity in the succulent plant family Crassulaceae (stonecrops), consisting of approximately 1,400 species.The Plant DNA C-values database gives GS data for just 47 Crassulaceae species.To start to fill this gap, flow cytometry was used to generate new genome size data using fresh leaf material of 147 Crassulaceae accessions available in the living collections of the Royal Botanic Gardens,Kew, and using various plant calibration standards to convert relatative values into absolute values. Combining these new data with those in the Plant DNA C-values database showed genome size values are now available for 162 species/cytotypes, with values ranging 62-fold, from 0.145 to 9.1pg/1C, and a mean of 1.91pg/1C.GS was seen to be extremely diverse in *Adromischus* [2.11-7.30pg/1C, based on 24 species] and *Sedum* [0.145-9.1pg/1C, based on 38 species] and extremely conserved in *Cotyledon* [2.87-3.32pg (1C), based on 13 species].It is obvious that genome size plays an important role in shaping the evolution of plant genomes and impacting plant community composition at the ecosystem level, it is therefore essential to generate a comprehensive dataset of genome size across all major taxonomic groups including Crassulaceae.

Keywords: stonecrop family, flow cytometry, large genomes, repetitive DNA

PO16 Biochemical responses of two tomato cultivars by cold treatment

Akram Ghorbanpour[1*], Ali Dehestani[2], Mohammad Ali Tajick Ghanbary[3], Azam Salimi[1], Hemmatollah Pirdashti[4] -*1. Department of plant biology, Kharazmi University, Tehran, Iran, 2. Genetics and Agricultural Biotechnology Institute of Tabarestan, Sari Agricultural Sciences and Natural Resources University, Sari, Iran, 3. Department of plant pathology, Sari Agricultural Sciences and Natural Resources University, Sari, Iran, 4. Department of Agronomy and Plant Breeding, Sari Agricultural Sciences and Natural Resources University, Sari, Iran. E-mail: a.ghorbanpor@gmail.com*

Cold stress is the main cause of reduced tomato yield in subtropical regions, especially in the seedling stage. Most current studies on cold stress have focused on the response of tomato shoots to cold stress. The aim of this study was to show the biochemical responses of the roots of two tomato-cultivars (*Lycopersicon esculentum* Mill.) Called CaljN3 and Peto Meck (PM) under cold treatment in greenhouse conditions in factorial completely randomized design under controlled conditions with three replications. The results showed that application of six-day cold stress increased the activity of phenylalanine ammonia lyase (PAL) and total phenol content in the roots of CaljN3 cultivar, However, in PM cultivar, cold reduced PAL enzyme activity by 18.6% and significantly increased total phenol content by 337%. With the application of cold stress in both cultivars, the activity of polyphenol oxidase (PPO) was significantly increased, which was

significantly higher (260.6%) in CaljN3 cultivar. Thus, despite the increase in PAL enzyme in CaljN3 cultivar, due to a significant increase in PPO enzyme, we saw a decrease in roots phenolic pool under cold stress, while, in PM cultivar, due to a 165% increase in PAL enzyme in leaves, we saw a significant increase in the accumulation of soluble phenolic compounds in the root, which may act as an adaptation mechanism to overcome oxidative stress due to low temperature in this cultivar.
Keywords: Polyphenol oxidase, Phenylalanine ammonia lyase, Total phenol, Adaptation

PO17 Root exposures to cadmium: morphological, physiological and embryological consequences in *Datura stramonium* L.

Zohreh Shirkhani[1*], Abdolkarim Chehregani Rad[2] -*1. Department of Plant Science, Faculty of Biological Science, Kharazmi University, Tehran, Iran; 2. Department of Biology, Faculty of Science, Bu-Ali Sina University, Hamedan, Iran. E-mail: zohreh.shirkhani@gmail.com*

Cadmium (Cd) is regarded as one of the most toxic metals and environmental pollutants. The aim of the study was to investigate the effect of cadmium root treatments (0, 75, 150 and 225 $mgkg^{-1}$) on morphological, physiological and embryological characteristics of *Datura stramonium.* The results showed that BCF and TF increased from 0.19 and 0.2 in the control group to 0.71 and 1.12 in the experimental group of 225 $mgkg^{-1}$Cd, respectively. In the group treated with 225 $mgkg^{-1}$of Cd, fresh and dry weight of root, fresh and dry weight of shoot, shoot length, root length, leaf area, cell membrane stability index and relative water content of tissue decreased 50.89, 43.75, 52.57, 46.27, 10.14, 24.04, 55.41, 31.35 and 24.21 percent respectively. The photosynthetic pigments content and soluble carbohydrate content in the Cd-treated plants were decreased in comparison to the control ones. The total protein content in the treatment group with 225 $mgkg^{-1}$Cd was 6.7 times of the control group. The highest peroxidase and polyphenol oxidase activity was also determined in the group treated by 225 $mgkg^{-1}$Cd. The results showed that Cd can cause to some abnormalities during the developmental process of pollen grains and ovule. Under Cd treatment, fragility, vacuolization and size of pollen grains were increased in comparison with control ones. Decreasing in the bioavailability of pollens and degeneration of embryo sac cells were the result of Cd pollution. It was found that Cd is capable of inducing chromosomal aberrations. The results was also indicated that *D. stramonium* has the Cd-accumulation and phytoremediation potency. It seemed that *D. stramonium* was able to resist the damages caused by Cd toxicity, via altering some physiological parameters and changing the protein content.
Keywords: phytoremediation, morphological parameters, physiological parameters, pollen grains

PO18 Lack of expression of drought microRNAs in the leaves of Narcissus pseudonarcissus L. under drought stress

Maryamalsadat Kamishirazi[1], Ahmad Majd[2*], Arbabian Sedighe[3], Golnaz Tajadod[4] -*1. PhD student, Azad University, North Tehran Branch, 2,3,4. Department of Biological Sciences, Azad University, North Tehran Branch. E-mail: mkamishirazi@gmail.com*

Advances in the world are causing changes in the living conditions of living organisms such as plants, and therefore with different methods, including molecular methods, must cope with environmental stressful conditions, such as drought stress. One mechanism is the regulation of gene expression after transcription by microRNAs(miRNAs). MiRNAs are non-coding nucleotides (length 20-22). Previous studies have shown that the expression of miRNAs can change in response to drought stress. Due to its many decorative, medicinal-health uses, the daffodil plant is expanding and becoming profitable not only in the domestic markets but also in its exports. Due to the vastness of arid and semi-arid climates in Iran, studies that can be effective in strengthening this plant with dehydration conditions in the future are useful and necessary. For this purpose, *Narcissus* bulbs were planted under different irrigation conditions (from once a week to once every two months). From the leaves of plants after two months, to extract the target gene of drought-related miRNAs, which according to the list in the NCBI gene bank, were micro RNA 159, with the target gene MYB and micro RNA 172, with the target gene AP2, by method qPCR was used. The two genes AP2 and MYB belong to transcription factors. The experimental results showed that despite the increase in expression of drought-related genes under drought stress, miRNAs did not show any change in expression, so it is possible that the lack of expression of miRNAs is somehow related to the increase in drought-related

genes. Due to the fact that the expression of drought genes and related miRNAs has been evaluated for the first time in *Narcissus pseudonarcissus* therefore this study can provide a good basis for further study in this context.

Keywords: MYB, AP2, microRNA 159, microRNA 172

PO19 The Study of Hexose Transporters Role in Determining Sink Strength of Tomato Fruits at Ripening Stage

Leila Aslani[1*], Mahdiyeh Gholami[1], Mostafa Mobli[1] - *1. Department of Horticulture, College of Agriculture, Isfahan University of Technology, Isfahan 84156-83111, Iran. E-mail: l.aslani@ag.iut.ac.ir*

An organ or tissue that produces more than its metabolic and growth needs and can export photosynthetic assimilates is considered as a source. The sinks are the consumers of photosynthetic materials, such as root, stem, meristems, and growing fruits. The sink strength is the competitive ability of a sink organ to attract assimilates and consists of sink size and sink activity. Sink size is a physical parameter that is determined by the cell numbers and cell size, whereas sink activity is a physiological parameter that is determined by many processes such as carbon metabolism, assimilate transport, and storage by the sink cells. To examine the physiological role of hexose transporters in determining the sink strength of individual fruits at the ripening stage, the regulation of hexose transporters gene expression and concentrations of glucose, fructose, and sucrose were studied when the sink/source ratio was altered in two cultivars of greenhouse tomato consist of 'Grandella' and 'Isabella' under the greenhouse condition. To this end, four sink/source ratios were applied: saving one fruit per truss (1F), two fruits per truss (2F), three fruits per truss (3F), and no fruit pruning (control). The results showed that fruit thinning could increase glucose, fructose, and sucrose concentrations in the fruits. It could also modulate the expression of tomato hexose transporter genes (*LeHT1*, *LeHT2*, and *LeHT3*). The availability of mobile assimilate to a particular sink may be determined by competition among sink organs, and based on the results of the present study, applying fruit thinning and limiting the number of fruits per truss, decreased competition in the truss and had a positive effect on the sink strength of individual fruit per truss, with considering the increased trend of *LeHT*s expression level by increasing sink strength, so we can conclude hexose transporters participate in determining sink strength at ripening stage of tomato fruits.

Keywords: Fructose, Glucose, Sink-source balance; Sucrose

PO20 Survey of intersectional position of *Bromus pectinatus* complex using molecular data

Akram Nasiri[1*], Shahrokh Kazempour Osaloo[1] -*1. Department of Plant Biology, Faculty of Biological Sciences, Tarbiat Modares University, Tehran 14115-154, Iran. E-mail: anasiri89@yahoo.com*

Bromus pectinatus complex is a group of tetraploid species that are classified in sect. *Bromus*, but its members are morphologically similar to species of sect. *Genea*, with lemmas that taper toward the apex and paleas whose morphology is intermediate between the two sections. Phylogenetic relationships of *B. pectinatus* complex and its allies were reconstructed base on nuclear and plastid sequences by using a wide range of species. A total of 34 taxa of *Bromus* species were included in phylogenetic analyses. Whole genomic DNA was extracted using a modified CTAB method or using Plant DNA kits. We amplified nrDNA ITS and ETS and, plastid matK regions using specific primer pairs via PCR reaction, and then sequenced PCR products. Phylogenetic interspecies relationships were constructed by Bayesian and likelihood analysis. In the combined nuclear trees, *B. pectinatus* complex species are nested within a clade that includes species of sect. *Bromus*, while in the plastid trees, its species are placed within sect. *Genea* species clade. The plastid and nuclear ribosomal data of this study indicated incongruency due to the position of *B. gedrosianus* and *B. pulchellus* (*B. pectinatus* complex), supporting intersectional hybrid origins for these species between sects. *Bromus* and *Genea*.

Keywords: *Bromus pectinatus* complex, hybrid origin, phylogeny, molecular data, Bayesian inference, Maximum likelihood

PO21 Effect of nano titanium dioxide on growth characteristics and antioxidant enzymes of Camelina (*Camelina sativa*) seedlings under the influence of sodium nitroprusside in salinity conditions

Ali Sepehri* - *Department of crop production and plant genetic, college of agriculture, Bu-Ali Sina University. E-mail: sepehri2748@gmail.com,* a_sepehri@basu.ac.ir

The effects of nano-TiO2 on growth indices and antioxidant enzyme activity of camelina seedlings under sodium nitroprusside and salinity stress was investigated in a factorial experiment with four replications in the crop physiology research laboratory of Bu-Ali Sina University. Nano Titanium Dioxide was studied at 500, 1000, and 2000 mg/L under 50 and 100 Mm sodium chloride salinity with 100 µM sodium nitroprusside and control. Salinity stress declined the growth characteristics and germination indices such as, germination percentage, germination rate, mean germination time, vigor index, radicle length, plumule length and the membrane electrolyte leakage increased. In the presence of nano-TiO2, most of germination indices improved and activity of CAT, APX and SOD enzymes increased. Sodium nitroprusside decreased the adverse effects of salinity stress and adjusted the membrane electrolyte leakage. Also the interaction effect of sodium nitroprusside and nano-TiO2 was significant on the most studied traits. Nano-TiO2 (1000 mg/L) with 100 µM SNP improved SOD, APX and CAT enzyme activities under 100 Mm salinity stress. According to the results, it seems that sodium nitroprusside diminished the adverse effects of salinity stress and impressed the nano-TiO2 performance on barley germination indices and antioxidant enzymes content.

Keywords: seed vigor, sodium chloride, germination indices, electrolyte leakage

PO22 Pollen studies on hysteranthous species of Colchicum L. (Colchicaceae)in Iran

Fatemeh Bazdid Vahdati[1*]; Marzieh Beygom Faghir[1], Mostafa Assadi[2] -1. *Department of Biology, Faculty of Science, University of Guilan, Rasht, Iran.* 2. *Research Institute of Forests and Rangelands, Tehran, Iran. E-mail: Fatameh_vahdati@yahoo.com*

Colchicum L. is a taxonomically very difficult genus of the family Colchicaceae .This genus includes c. 100 species, which 15 species is reported of Iran. The main purpose of this study is to analyze palynological characters of the members of the genus and evaluating the systematical efficiency of these features. In the current survey, pollen morphology characters of the genus *Colchicum* L., comprising 3 hysteranthous species (*C. kotschyi*, *C.persicum*, *C.speciosum*) are examined using scanning electron microscope (SEM) and light microscope (LM). These investigations on the pollen of *Colchicum* taxa are reported for the first time in Iran. The pollen grains are monad, bilateral symmetrical, isopolar, diporate, medium in size, elliptical (from equatorial view) in outline, subprolate to prolate in shape. The studied taxa are divided into three groups based on exine ornamentation: supra-reticulate, rugulate-microreticulate and reticulate. Pores are almost circular. The result supports current classifications and emphasizes the importance of pollen morphology traits special ornamentation exine for separating the species of the genus.

Keywords: Exine, Morphology, Ornamentation, Palynology

PO23 The effect of dehydration stress on gene expression *PMP3-6* in sensitive and drought-resistant tomato cultivars

Peyman Aghaie[1*], Amir Hossein Forghani[1] -*1. Department of Biology, Faculty of Science, Payame Noor Universtiy, PO BOX 19395-3697 Tehran, Iran. E-mail: peyman.aghaie@pnu.ac.ir*

Drought is one of the most important factors limiting growth and development and one of the main factors reducing production in plants. The plant's response and adaptability to this environmental stress have high biological complexities at the physiological, biochemical, cellular, molecular, and morphological levels. In recent years, much progress has been made in deciphering the physiological and molecular mechanisms of the stress response, which may eventually lead to increased drought resistance in crops. The plasma membrane plays an important role in maintaining cell homeostasis and signal transmission. Therefore, it is important to protect the plasma membrane when exposed to abiotic stresses. Plasma membrane proteolipid 3 (PMP3), as a member of the small hydrophobic polypeptides, may play an important role in dealing with

abiotic stresses. To evaluate the effectiveness of this gene in protecting cell membranes, in addition to evaluating ion leakage and membrane peroxidation, the rate of ROS changes and the relative expression of this gene in stressed plants after 16 hours and 6 days (as short-time and long-time, respectively) after stress and symptoms of dehydration, were assessed. In these experiments, two sensitive and drought-resistant varieties of tomatoes were used as a model system. The results showed that the rate of ion leakage and membrane lipid peroxidation in the long-term in the sensitive line was higher than the tolerant cultivar. The highest increase in *PMP3* gene expression was observed in susceptible cultivar in the short-time water stress. High expression of the *PMP3-6* gene in the tolerant cultivar may help the plant to regulate osmotic pressure and maintain turgor pressure in the short time after drought stress, and increase the plant's tolerance to drought in the early stages of stress.

Keywords: Drought, Electrolyte Leakage, Lipid peroxidation

PO24 Comparison of different concentrations of *Scrophularia striata* and *Prosopis fracta* extracts on removing of parasites in raw vegetables from Ilam province

Zoleikhah Mehdizadeh[1], Hamid Darvishnia[1*], Zahra Baghaeifar[1], Shahriar Saeedian[1] -*1. Department of Biology, Payame Noor University, 19395-3697 Tehran, Iran. E-mail: darvishnia_h@yahoo.com*

Parasitic diseases are considered as the most prevalent problems in developing countries. The consummation of raw vegetables is the main way for transmission of parasitic infections to human and other animals. The aim of the present study was to compare the effects of different concentrations of Hydro-Alcoholic extract of *Prosopis fracta* and *Scrophularia striata* on removing of parasites from raw vegetables. In this experimental study, plant samples were collected from the mountainous areas close to Ilam and Mehran. Samples were dried in the shade; the powder was prepared with the help of an electric grinder. Hydro-Alcoholic extract of plants was obtained using Soxhlet apparatus and 50% ethanol. Raw vegetables were washed in 0/01, 0/1, 1 and 2% concentrations of *S. striata* and *P. fracta* extract, and with contact time of 15 minutes. Then the samples were removed and after 24 h, remaining washing solution of each of the solutions was centrifuged. Then the slides were prepared from sediments and were examined with light microscope. Results show that the maximum parasites removing by *P. fracta* and *S. striata* extract was obtained at 1% and 2% concentrations, respectively. Also, in comparison between these two concentrations, 2% extract of *S. striata* is more effective in parasite removing in vegetables. Due to the effective role of Hydro-Alcoholic extract of *S. striata* and *P. fracta* to remove parasite from raw vegetables, these two medicinal plants can be considered as an effective and new solution for proper washing of vegetables, and considered them as natural detergent and cleanser that have a good disinfectant power of edible fruits and vegetables.

Keywords: Raw Vegetables, Parasite removing, Plant Extract, Medicinal plants, Natural Detergents

PO25 Diatom Flora of Selected Streams in the Central Alborz Region, Northern Iran

Amin Ghavam[1], Ehsan Atazadeh[2]*- *1. Department of Plant Sciences, School of Biology, Faculty of Sciences, University of Tehran, Tehran, Iran;2. Department of Plant Biology, Faculty of Natural Sciences, University of Tabriz, Tabriz, Iran*
E-mail: atazadeh@tabrizu.ac.ir

Diatoms are of high importance in systematics, ecology, genetics and bio-based industries and account for a major part of phycological researches worldwide. However, in Iran which is a large country with different aquatic ecosystems, not much investigations have been conducted on such aspects of diatoms; of which the share of the southern slope of the Central Alborz Region is quite a few. In this research, the diatom flora of the parts of the Jajrood River and some less-noticed nearby streams in northeastern Tehran (zone 1) and Kordan and Hazarband Rivers in northwestern Tehran (zone 2) were studied and compared. In each zone, algal periphyton samples were collected from 5 sampling stations. Samples were treated with hot 35% H_2O_2 and 32% HCl to remove the minerals and organic materials and clean up the siliceous frustule of diatoms. From 10 studied stations, a total of 137 taxa were found, representing 39 genera and 20 families. 35 taxa are new records for diatom flora of Iran. *Navicula*, *Nitzschia* and *Gomphonema* were the most species-rich genera and Bacillariaceae, Gomphonemataceae and Naviculaceae were the most genus-rich families

recorded. Some species are known as pollution-, salinity-, and acidity-tolerant. Some other are alpine and subalpine taxa. Comparison between the data from this study and other researches in Iran, neighboring countries and other regions in Europe and North America shows that despite undeniable similarities between two studied zones and the mentioned areas, some taxa are unique to the studied areas. Also the similarities are more evident between studied zones and European and North American alpine and subalpine ecosystems than that of neighboring countries. For future studies, including more streams, and considering water physiochemical characteristics, ecological relationships of diatoms, evolution and population genetics and matching climatic and geological data with recorded species diversity could be a great step forward.

Keywords: *Kordan River, Hazarband River, Jajrood River ,biodiversity, algal periphyton*

PO26 The effect of salinity stress on morphological traits of seedlings of *Origanum vulgare*

Meysam Keshtkar Garousi [1,2], Forough Sanjarian*[1], Alaeddin Kordenaeej[2]- *[1]Plant Bio-product Group, National Institute of Genetic Engineering and Biothechnology (NIGEB), Tehran. Iran; [2]Department of Agronomy and Plant Breeding, College of Agricultural Sciences, Shahed University,Tehran, Iran. E-mail: fsanjarian@nigeb.ac.ir*

Today, medicinal plants are one of the most economically important plants. Marjoram, *Origanum vulgare* is considered as an important medicinal plant. Salinity reduces soil fertility, and it is one of the important factors limiting the production and ultimately the supply of food. The degree of salinity resistance varies for different plants at the germination stage. In this study, the seeds of the plant were grown in the presence of different levels of salinity and the effect of stress on morphological traits at the early stages of plant growth was investigated. This experiment was performed in a completely randomized design with three replications. Fifteen plant seeds were sterilized with 30% sodium hypochlorite then were cultured in MS 0/5 X medium on autoclaved 2 * 2 cm mesh. Salinity treatments included 0 (as control), 50, 100, 150 and 200 mM / L sodium chloride (NaCl). Two weeks after culture, the morphological traits of the treated seedlings were compared with the control sample. According to the results, salinity treatment caused significant changes in plant shoot and roots length. In addition, increasing the dry weight of seedlings was observed with increasing salinity stress. According to the data, it can be concluded that different levels of salinity stress have different effects on the seeds of *Origanum vulgare*.

Keywords: *Origanum vulgare*, morphological traits, Salinity

PO27 Biosystematics of Endemic Gypsophyte Populations in Semnan, Iran

Fatemeh Rabizadeh[1] *-1. Department of Biology, Women's University of Semnan (Farzanegan), Semnan, Iran. Email: Rabizadeh@fgusem.ac.ir*

Ecological adaptation in specific ecosystems, such as Semnan Province gypsum communities, leads to the biodiversity of endemic plants. Gypsum desert ecosystem of Iran, Despite their immense ecological values, have been less investigated for gypsophyte vegetation with much reserch on the biological conditions of endemic gypsophyte species and understanding their compatibility. To achieve this objective, the following activities were undertaken: 1) Identificating of plants in gypsum zaone of 30,000 hectares, 2) Investigating of the relationship between principle ecological factors and plants, 3) Grouping plants relative to soil gypsum and lime contents and altitude and 4) Comparising of the anatomical, micro-morphological and ecological characteristics of the species of *Astragalus semnanensis* Born & Rech.F. ،*Astragalus fridae* Rech.F. ، *Gypsophila mucronifolia* Rech.F و *Motkia gypsaceae* Rech.F. Ecological data and soil samples were collected. 47 plant species, including 6 endemic species of Semnan and 20 endemic species of Iran were identified, and were grouped using CCA and DCA grading analysis, as gypsophytes (G_1) at altitudes of 1600 to 2250 m, including the species *Astragalus fridae* and *Motkia gypsaceae*, limestones (C) at an altitude of 1500-1700 m, have *Acanthophyllum microcephalum* , gypsophytes (G_2) at 1300 to 1600 meters with *Astragalus semnanensis* and halophytes (H) with *Artemisia sieberi* species at altitudes of 1100-1300

m above sea level. There is a positive correlation between indicators of biodiversity and height and gypsum and a negative correlation between these factors and the sodium content, EC and soil pH. The adaptabilities of some gypsophytes show, although biologicall factors which are themselves affected by the climate, are important in determining the adaptability of plant species, the genetic variation of species over the course of time that provide conditions for endemic species propagative in specific substrates such as gypsum.

Keywords: gypsophyte, calciphyte, halophyte, Semnan endemic plants

POSTER PRESENTATIONS

\

PP1 Morphological and molecular characterization of seed-borne fungi from cumin fields in Razavi Khorasan province

Nima Khaledi[1*] -*1. Seed and Plant Certification and Registration Research Institute, Agricultural Research, Education and Extension Organization (AREEO), Karaj, Iran. E-mail:n.khaledy@areeo.ac.ir*

Cumin (*Cuminum cyminum* L.) is one of the most important and economical medicinal plants. Seed-borne fungi as one of the most important factors that threatens the health of seeds, and lead to reduce germination and vigor indices and finally reduce production. The aim of this study was to identify of seed-borne fungi of cumin from some cumin fields in Iran. In order to identify of seed-borne fungi cumin from fields of Mashhad, Quchan and Fariman was sampled according to the International Rules for Seed Testing (ISTA). For isolation of fungi, cumin seeds were washed in tap water surface disinfested in 1% sodium hypochlorite and were placed on general and specific culture media with alternating 12 hours light and 12 hours darkness at 25˚C. Purification of fungal colonies was performed using single spore and hyphal tip methods on 2% water agar medium. A total of 45 isolates were identified based on morphological and molecular characteristics (ITS-rDNA regions were amplified by ITS1 and ITS4 primers and a partial sequence of the β-tubulin gene, different fungal taxa including *Alternaria alternata*, *A. burnsii*, *Fusarium oxysporum* and *F. solani*. Overall the highest frequency of isolated fungi was related to the genus *Alternaria*. Among the species identified, *A. alternata* was the predominant species with the highest isolation frequency and relative density of 100% and 66.7% respectively. The cumin seeds collected from Mashhad field was more infected with fungi than the other fields sampled.

Keywords: Seed, Morphological, Seed health, Molecular

PP2 Morphological and molecular characterization of seed-borne fusarium from some black cumin fields in Iran

Nima Khaledi[1*] - *1. Seed and Plant Certification and Registration Research Institute, Agricultural Research, Education and Extension Organization (AREEO), Karaj, Iran. E- mail: n.khaledy@areeo.ac.ir*

Black cumin (*Nigella sativa* L.) is one of the most important medicinal plants belonging to Ranunculaceae family. Seed-borne fungi as one of the most important factors that threatens the health of seeds, and lead to reduce germination and vigor indices and finally reduce production. The aim of this study was to identify of seed-borne fusarium of black cumin from some black cumin fields in Iran. In order to identify of seed-borne fusarium black cumin from fields of Gorgan, Bushehr, Shahreza, Fereydan and Semirom were sampled according to the International Rules for Seed Testing (ISTA). For isolation of fungi, black cumin seeds were washed in tap water surface disinfested in 1% sodium hypochlorite and were placed on general and specific culture media with alternating 12 hours light and 12 hours darkness at 25˚C. Purification of fungal colonies was performed using single spore and hyphal tip methods on 2% water agar medium. A total of 17 isolates were identified based on morphological and molecular characteristics (ITS-rDNA regions were amplified by ITS1 and ITS4 primers and a partial sequence of the β-tubulin gene, different fungal taxa including *Fusarium oxysporum* and *F. solani*. Among the species identified, *F. oxysporum* was the predominant species with the highest isolation frequency and relative density of 80% and 94.1% respectively. The black cumin seeds collected from Gorgan field was more infected with fungi than the other fields sampled. The results of this study can be used to complete the basic information for identifying of seed-borne fusarium of black cumin and help to writing the national seed health standard.

Keywords: Seed, Fungal pathogen, Morphological, Molecular

PP3 Effect of Source-Sink Balance on Hormone content and Fruit Size of Greenhouse tomato

Leila Aslani[1*], Mahdiyeh Gholami[1], Mostafa Mobli[1] -*1. Department of Horticulture, College of Agriculture, Isfahan University of Technology, Isfahan 84156-83111, Iran. E-mail: l.aslani@ag.iut.ac.ir*

Regulation of fruit size is a major issue in higher plant development, and an economic factor for many horticultural crops, consist of tomato. Under non-limiting environmental factors of photosynthesis, fruit size is mainly restricted by the number of fruits per plant or sink-source balance because of difference in sink strength or in other words the competitive ability of a sink organ to attract assimilates. Therefore, the

present study was undertaken to investigate the effect of the sink-source balance in determining the size of individual fruits at the different developmental stages of greenhouse tomato cultivar 'Grandella'. To this end, a split-plot factorial experiment was conducted based on a completely randomized design with three replications. Two treatments were applied: saving one fruit per truss (1F), and no fruit pruning (control). Three developmental stages of tomato fruit including cell division (15-day after treatment; DAT), cell expansion (30-DAT), and ripening (45-DAT) were studied. The auxin and cytokinin content of fruits was measured using high-performance liquid chromatography (HPLC). The results showed that fruit thinning could increase auxin and cytokinin concentrations. Fruit weight and pericarp thickness were determined by sink-source balance. Similar patterns of auxin, and cytokinin concentrations, pericarp thickness, and fruit weight during developmental stages of tomato fruits suggested the controlling role of auxin and cytokinin in determining fruit size by regulating cell division, cell expansion, and mobilization of photoassimilates. Based on the results of the present study, applying fruit thinning and limiting the number of fruits per truss, decreased competition in the truss and had a positive effect on the sink strength of individual fruit per truss, so we can conduct that auxin and cytokinin are involved in growth processes or regulation of sink strength in fruits.

Keywords: Auxin, Cytokinin, Fruit weight, Pericarp thickness, sink strength

PP4 Morphological and molecular characterization of seed-borne fungi in native Fennel populations

Nima Khaledi[1*], Farshid Hassani[1] -*1. Seed and Plant Certification and Registration Research Institute, Agricultural Research, Education and Extension Organization (AREEO), Karaj, Iran. E-mail: n.khaledy@areeo.ac.ir*

Fennel (*Foeniculum vulgare* Mill.) is one of the most important and economical medicinal plants. Seed-borne fungi as one of the most important factors that threatens the health of seeds, and lead to reduce germination and vigor indices and finally reduce production. The aim of this study was to identify of seed-borne fungi of fennel from some fennel fields in Iran. In order to identify of seed-borne fungi fennel from fields of Golestan (Aliabad county), Zanjan (Khodabandeh county), Kurdistan (Marivan county) and Hamedan (Nahavand county) provinces were sampled according to the International Rules for Seed Testing (ISTA). For isolation of fungi, fennel seeds were washed in tap water surface disinfested in 1% sodium hypochlorite and were placed on general and specific culture media with alternating 12 hours light and 12 hours darkness at 25˚C. Purification of fungal colonies was performed using single spore and hyphal tip methods on 2% water agar medium. A total of 33 isolates were identified based on morphological and molecular characteristics (ITS-rDNA regions were amplified by ITS1 and ITS4 primers and a partial sequence of the β-tubulin gene, different fungal taxa including *Alternaria alternate* and *Fusarium oxysporum*. The fennel seeds collected from Aliabad field was more infected with fungi than the other fields sampled. The results of this study can be used to complete the basic information for identifying of seed-borne fungi of fennel and help to writing the national seed health standard. This is the first report on identify the seed-borne fungi of Iranian native fennel seed populations.

Keywords: *Alternaria*, Morphological, Seed health, *Fusarium*, Molecular

PP5 Investigation of the role of triacontanol in neutralizing the destructive effects of salinity stress in plants

Kobra Mahdavian [1*] -*1. Assistant Professor, Department of Biology, Faculty of Science, Payame Noor University, Tehran, Iran. E-mail: k.mahdavian@pnu.ac.ir*

Soil salinity is one of the most common abiotic stresses that negatively affects crop growth. Salinity leads to osmotic stress, production of reactive oxygen species, oxidative damage to cells and their metabolic processes, and ultimately reduced crop yield. Phytohormones play an important role in reducing abiotic stresses in plants. Triacontanol is a long-chain primary alcohol first discovered in alfalfa and acts as a plant growth regulator to improve growth in crops. Its external application promotes growth, nutrient uptake, photosynthetic pigments, soluble proteins, sugars and free amino acids in plants. Triacontanol reduces the toxic effects of plants under abiotic stresses by increasing growth, photosynthetic pigments and enzymatic antioxidant activity. Considering the different physiological and biochemical rols of triacontanol in plants

under salinity stress, it is very desirable to study its role and mode of action. It has been reported that a concentration of 10 mM triacontanol increases physiological processes under salinity stress in soybean. Concentrations of 50 and 100 µM triacontanol also increased shoot and root length, fresh and dry weight under salinity stress in sunflower. Therefore, external application of triacontanol can increase the tolerance of plants under salinity stress.

Keywords: Plant growth regulator, Growth parameters, Phytohormone

PP6 Response of Summer savory seeds to gamma irradiation at germination and seedling stages

Maryam Ghannadnia* - *Department of Horticultural Sciences Engineering, Faculty of Agriculture and Natural Resources, Imam Khomeini International University, Qazvin, Iran. E-mail: ghannadnia@eng.ikiu.ac.ir*

Germination is the first and most important stage in the life cycle of the plants. In this study the effect of different doses of gamma radiation (0, 15, 30, 60 and 90 Gray) was investigated on some seed germination factors and morphological characteristics of the seedlings of summer savory *(Satureja hortensis*). Seed irradiation was performed at the Nuclear Agriculture Research School, Nuclear Science and Technology Research Institute (NSTRI), Karaj, Iran, using Gamma- Cell Facility Issledovatelj- PX-30 device. In this regards, a factorial experiment was conducted in a randomized complete block design with 4 replications. Results showed that 90 Gray treatment increased the germination percentage and reduced seed vigour significantly. Although the length of stem-lets showed a significant decrease in 90 Gray treatment (3.9 cm), the highest dry weight of seedlings was also observed in this treatment (0.55 mg). The treatments showed no significant difference on the other characters of germination including germination speed, average time of germination and length of the root-lets. The final results revealed that application of 90 Gray dose of γ irradiation could be useful in enhancing germination percentage of seeds and dry weight of Summer savory seedlings.

Keywords: γ irradiation treatment, medicinal plant, dry weight of seedling

PP7 Study of the *Falcaria vulgaris* extract anticancer effects on growth of ectopic breast tumor in mice

Zahra Ghavidel [1], Zahra Samadi[1], Toktam Hajjar [2*], Madjid Momeni-Moghadam[2], Eisa Kohan-Baghkheirati[2] -*1. MSc of Cellular-Molecular Biology, Faculty of Basic Sciences, Hakim Sabzevari University, Sabzevar, Iran, 2. Faculty member at the Department of Biology, Faculty of Basic Sciences, Hakim Sabzevari University, Sabzevar, Iran. E-mail: t.hajjar@hsu.ac.ir*

Breast cancer is a major cause of cancer death among women around the world .Surgery, radiation and chemotherapy are commonly used to treat breast cancer along with hormone therapy. Despite of major advances in the control and treatment of breast cancer, side effects and ineffectiveness of existing methods lead to identification and use compounds of medicinal plants. Hence, the anticancer effects of *Falcaria vulgaris* extract on growth of ectopic breast cancer in balb-c mice was evaluated. Ectopic breast tumor was induced by injection of 4T1 cell line in both treatment and control balb-c mice. The treatment group was received *Falcaria vulgaris* hydroalcoholic extract 10 times in a period of 20 days. Tumor mass volume was measured during the treatment period and after the sacrifice of mice. Analysis of results with Repeated ANOVA test showed that *Falcaria vulgaris* extract prevented the increase of tumor volume during the period in the treatment group compared to the control group, significantly ($P < 0.05$). These results indicate that *Falcaria vulgaris* extract has anti-cancer effects on the growth of ectopic breast tumor mass in the balb-c mice. This effect can be due to the anti-cancer compounds of *Falcaria vulgaris* extract. The isolation and identification of those metabolites could be employed as a suitable treatment in the control of breast cancer growth.

Keywords: *Falcaria vulgaris*, balb-c mice, breast cancer, 4T1 cell line

PP9 The Study of generative organs in Ageratum

Zahra Baghaei Far[1], Sed Ebrahim Hoseini Nia[1], Fatemeh Ghadirpour[1]*, Atefeh Mehr Afza[1], Leila Khodaii[1] -1. *Biology Dept., Payam Noor University, Tehran, I.R. of Iran,* 2. *School of Agriculture , Payam Noor University , Tehran, I,R of Iran. E-mail: ghfatemeh12@yahoo.com*

The present research aims to study pollen grain and ovule development in *Ageratum houstonianum*. It can be suitable pattern for several species of capitule inflorescence, The flowers and buds in different developmental stages were removed, fixed in FAA70, stored in 70% ethanol, embedded in paraffin and sectioned with a thickness of 5-7 µm by microtome. Staining was carried out with Eosine and Hematoxylin. Then slides were studied using light microscope and were photographed. Results indicated that in bisexual florets, consist of five stamens with free filaments and apart from each other. Anthers are tetrasporangiated and development of anther wall is of dicotyledonus type and composed of one-layered epidermis, an endothecium, one middle layer and tapetum. the tapetum was plasmodial. Microspore tetrads are tetrahedral. Pollen grains are three colpated with echinated sculpturing, at the shedding time. Ovule was anatropous, unitegumic and tenuinucellate. Cell division of megaspore mother cells is of both longitudinal and transverse type and resulted to form linear or massive tetrads.The embryo sac development is of the polygonum type. Results of this research showed the presence of formed crystals in anther, the layer endothecium wall anther, epidermal cells of ovary, ovule, style, stigma and petal that was species specific characteristic. secretory (papillate) epidermis on the adaxial surface of petals, On the outer surface of petal long, filamentous and one-celled trichoms were visible.

Keywords: Asteraceae, Tapetum, Ovule, Megasporogenesis, Microsporogenesis, *Ageratum houstonianum*

PP10 Study of the genus *Astragalus* L. in Lordegan area

Saadi Ahmadi[1], Ali Bagheri[1*], Hojjatollah Saeidi[1] -*1. Department of Plant and Animal Biology, Faculty of Biological Science and Technology, University of Isfahan, Isfahan, Iran. E-mail: a.bagheri@sci.ui.ac.ir*

This research is related to the study of diversity and distribution of the genus *Astragalus* (Fabaceae) in the county of Lordegan (Chaharmahal and Bakhtiari province). The county of Lordegan has an area of about 3420 km^2 and is located in the south of Chaharmahal and Bakhtiari province, with moderate and semi-arid climate. Plant samples were collected from March 2017 to August 2018 for this study. Prior to this study, 12 taxa were reported in the Lordegan County, here, with 17 new taxa for the Lordegan, number of taxa increased to 29 in this county. These 29 taxa belonging into 12 sections. Among them, section *Caprini* DC. with 7 spp. is the largest section in the county followed by section *Malacothrix* Bunge with 4 spp. Only *A. ahmad-parsai* Maassoumi and *A. chamanbidensis* Maassoumi & Mozaf. are endemic to the Lordegan, 8 taxa have global distribution pattern, and other taxa are endemic to Iran. In terms of life forms, Hemicripptophytes with 48% were the most common life form in the county, followed by Camphytes with 45%, Phanerophytes with 3.5%, and Trophytes with 3.5%.

Keywords: taxonomy, Legumes, Zagros, endemic species, Chaharmahal and Bakhtiari province

PP11 Investigating of the effect of *T. harzianum* AK20G on leaf elements in two tomato cultivars

Akram Ghorbanpour[1*], Ali Dehestani[2], Mohammad Ali Tajick Ghanbary[3], Azam Salimi[1], Hemmatollah Pirdashti[4] -*1. Department of plant biology, Kharazmi University, Tehran, Iran, 2. Genetics and Agricultural Biotechnology Institute of Tabarestan, Sari Agricultural Sciences and Natural Resources University, Sari, Iran, 3. Department of plant pathology, Sari Agricultural Sciences and Natural Resources University, Sari, Iran, 4. Department of Agronomy and Plant Breeding, Sari Agricultural Sciences and Natural Resources University, Sari, Iran. E-mail: a.ghorbanpor@gmail.com*

Trichoderma species are widely used in agriculture and industry as biopesticides and source of enzymes. In this study, the effectiveness of *Trichoderma harzianum* AK20G on leaf elements content of two tomato cultivars (*Lycopersicon esculentum* Mill.) CaljN3 and Meck Peto (PM) was studied in factorial arrangement using completely randomized design with three replications under controlled conditions. Inoculation of *T. harzianum* AK20G in PM cultivar increased the concentration of iron, phosphorus, potassium and calcium, but in CaljN3 cultivar, only calcium and potassium increased under the influence of this fungus and its

phosphorus content decreased by 11.3%. Mycorrhizal fungi coexist with plant roots and penetrate into cortical cells, while at the same time spreading their roots into the soil, absorbing nutrients, especially phosphorus, which has little mobility, thus converting unabsorbed phosphorus into soil to phosphorus that can be used by plants. This experiment showed that the behavior of this fungus is different in different cultivars of one plant and it seems that more studies are needed to determine the exact mechanisms of the effect of this fungus in tomato cultivars.

Keywords: Phosphorus, Calcium, Iron, Potassium

PP12 Investigating the combined effect of preservative XEDAMix and hot water treatment on the physicochemical properties of Novell orange during cold storage

Ali Dehestani[1], Azad Omrani[2], Akram Ghorbanpour[3*], Mahsa joolaee[4] and Mostafa Haghpnah[5] -*1. Genetics and Agricultural Biotechnology Institute of Tabarestan, Sari Agricultural Sciences and Natural Resources University 2. Middle East Fruit Science Institute, 3. Department of plant Biology, Faculty of Science, Kharazmi University, 4. Department of Agronomy, Sari Agricultural Sciences and Natural Resources University 5Department of Genetics and Plant Breeding, Sari Agricultural Sciences and Natural Resources University. E-mail: a.ghorbanpor@gmail.com*

The use of chemicals and environmental pollutants is one of the problems of human society. Researchers for human health and environmental protection have studied several non-chemical methods to replace them with chemical methods. In this study, the fungicide effect of commercial preservative XEDAMix in combination with hot water at 40, 42, 44 and 46 °C for two minutes on Novell orange (*Citrus sinensis* cv. Thomson Navel) during three months of storage period (0, 30 60, 90 days) were evaluated in the cold storage at 5.5 °C. The statistical approach was based on completely randomized statistical design with factorial arrangement in four replications. Traits of total soluble solids in fruit juice (TSS), pH and tissue hardness were measured in all treatments during storage periods immediately after removing the fruit from the refrigerator. The amount of TSS in fruits during the storage period in the control treatment showed a decreasing trend, which may indicate the phenomenon of fermentation in fruits. However, in the combined treatments of XEDAMix and heat therapy, the content of soluble solids increased significantly compared to the control treatment. The pH of fruits increased during the storage period in the control treatment and did not change significantly in disinfected fruits in combination of 42 °C hot water, but with increasing water temperature, the pH decreased significantly during 90 days of storage. The decrease in fruit tissue firmness was less after 90 days of storage in XEDAMix treatment with 42 °C hot water. The results showed that in cold storage conditions of 5.5 °C, XEDAMix treatment along with heat therapy with 42 °C hot water can be used as a suitable method to increase storage life and maintain the quality of Novell oranges.

Keywords: Post harvest, Thomson oranges, storability, heat treatment, TSS

PP13 Study of the combined effect of XEDAMix hot water treatment and preservative on storage of pomegranate

Ali Dehestani[1], Azad Omrani[2], Mostafa Haghpnah[3], Akram Ghorbanpour[4*], Mahsa joolaee[5] -*1. Genetics and Agricultural Biotechnology Institute of Tabarestan, Sari Agricultural Sciences and Natural Resources University 2. Middle East Fruit Science Institute, 3. Department of Genetics and Plant Breeding, Sari Agricultural Sciences and Natural Resources University, 4. Department of plant Biology, Faculty of Science, Kharazmi University, 5. Department of Agronomy, Sari Agricultural Sciences and Natural Resources University. E-mail: a.ghorbanpor@gmail.com*

Fruit spoilage of pomegranate is one of the most important problems in postharvest stages and its exports. This decay is mainly due to the influence and spread of saprophytic or parasitic fungi into the pomegranate fruits. Therefore, in the present study, fungicide effect of commercial preservative XEDAMix in combination with hot water at 46, 48, 50 and 52 ˚C for two minutes on maintaining the quantitative and qualitative characteristics of pomegranate fruit of Malas of Neyriz cultivar in cold storage conditions for zero, 60 and 120 days was examined. The statistical approach was based on completely randomized statistical design in four replications. The results showed that the activity of guaiacol peroxidase (GPX) in the control increased after 60 days of storage, However, in fruits treated with XEDAMix + hot water at 46 and 48 ˚C, there was a more significant increase than the control. Further activity of phenylalanine ammonia lyase (PAL) was also observed in the hot water of 48 ˚C and XEDAMix treatment. It was also observed that the use of combined hot water treatments at 46 and 48 ˚C and XEDAMix significantly reduced the

activity of polyphenol oxidase (PPO) compared to the control treatment and with decreasing the activity of this enzyme, the oxidation of phenolic compounds was reduced. Based on the results of this study, it was shown that the combined treatment of hot water and XEDAMix is useful in improving storage, and in comparison, hot water at 46 and 48 ˚C was involved in maintaining the activity level of antioxidant enzymes and increasing the expression of genes involved in the production of phenolic compounds, as a result, they have been more effective in maintaining the strength and firmness of fruit tissues.
Keywords: Post harvest, polyphenol oxidase, phenylalanine ammonia lyase, guaiacol peroxidase

PP14 Morphological study of different populations of *Astragalus cyclophyllon* Beck in Iran

Fatemeh Aliabadi[1], Ali Bagheri[1*], Hojjatollah Saeidi[1] - *1. Department of Plant and Animal Biology, Faculty of Biological Science and Technology, University of Isfahan, Isfahan, Iran. E-mail: a.bagheri@sci.ui.ac.ir*

Astragalus cyclophyllon Beck from Fabaceae family belonging to the section *Incani* DC. is an endemic species to Iran. This species is distributed in western and central parts (including Hamedan, Kurdistan, Isfahan, Kohgiluyeh and Boyer-Ahmad, Chaharmahal Bakhtiari and Markazi provinces) of the country. In this study, 80 individuals from 29 populations of *A. cyclophyllon* were collected from different localities of the species. Quantitative and qualitative morphological characters such as pedicel length, number of the leaflets, calyx length, leaf shape, standard shape, etc., were examined. A total of 33 morphological characters were analyzed using NTSYS software ver.2.2 by UPGMA method, and a dendrogram was drawn. The results of the morphological data showed that the most morphological differences were observed in the populations collected from Isfahan province compared to other populations.
Keywords: taxonomy, Legumes, section *Incani*, endemic species, interspecific relationships

PP15 Assessment the effect of explant type and hormone on the callogenesis of Salvia tebesana Bunge

Amin allah Shoja[1], Monireh Cheniany [1]*, Ali Ganjeali[1], Mahshid Tabarifard[1] -*1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran. E-mail: Cheniany@um.ac.ir*

Salvia tebesana is a beneficial species among the other of *Salvias* in respect to its famous chemical-medicinal compounds such as tannins, monoterpenes, diterpenes, sesquiterpenes, and flavonoids. Nowadays, one of the most useful and practical ways to produce the plant secondary metabolites is tissue culture technique and callus induction. This study was based on the designation of the optimal concentration of BAP (0, 0.5, and 1 mg L^{-1}) and 2,4-D (0, 0.5, 1, and 1.5 mg L^{-1}) for callus induction from "shoot apical meristem" and "leaf" explants of *S. tebesana* on MS medium. The explants were isolated from *S. tebesana* grown in Hoagland solution. Cultured samples on MS medium were subcultured after six weeks and analyzed statistically at the end of 8th week in terms of callus induction rate (%), form, fresh and dry weight (gr) of callus. The results showed that leaf explant was more successful than shoot apical meristem explant for callus induction. Although 100% callus induction was observed in the "BAP_1 + 2,4-D_1 mg L^{-1}" treatment and for shoot apical meristem explant, other high callogenesis percentage was observed for leaf explants. Evaluation of callus fresh and dry weight changes also showed a significant effect ($p<0.05$) of the type of explants and hormones on these traits.
Keywords: *Medicinal plant*, Callus culture, MS medium culture, BAP, 2,4-D

PP16 The effect of aqueous extract of cyanobacterium *Nostoc commune* on sesame seeds

Amiri Sara[1], Ehsan Nazifi[1*], Bagher Seyed Alipour[2] -*1. Department of Plant Sciences; 2Department of Cellular and Molecular Biology; University of Mazandaran. E-mail: e.nazifi@umz.ac.ir*

The use of biofertilizers instead of chemical fertilizers is preferred due to economic and environmental benefits. Sesame is one of the profitable and strategic plants and due to the beneficial effects of *Nostoc* cyanobacteria as a biofertilizer, in this study the effect of aqueous extract of cyanobacterium *N. commune* on growth indicators in sesame was investigated. Aqueous extract was prepared at a concentration of 0.1 g l^{-1} and then at concentrations of 0, 5, 10, 20, 30, 40, 60 and 80% was added to Petri dishes containing 10

sesame seeds and seedlings were harvested after 8 days. The results showed that wet weight, seedling length and root length indicators were significantly different between different concentrations. Concentrations of 60% and 80% showed the lowest fresh weight, seedling length and root length. The highest fresh weight was related to the concentration of 10% and the highest seedling and root length was related to the control group; however, there was no significant difference with 10% concentration. Seedlings grown at 30% concentration showed the highest amount of chlorophyll a and carotenoids and seedlings grown at 40% concentration showed the highest amount of chlorophyll b. The results showed that high concentrations of the extract had a negative effect on growth indicators while low concentrations had positive effects on fresh weight and the photosynthetic pigments content. It seems that with longer treatment period, low concentrations of aqueous extract of *N. commune* can probably be a good stimulant for growth of sesame.
Keywords: Seedling length, photosynthetic pigments, growth indicators, biofertilizer, fresh weight

PP18 Investigation of phytochemical diversity of *Daphne mucronata* collected from three regions of West Azerbaijan province

Asma Salimi[1], Abbas Hassani[2]*, Ramin Maleki[3], Soniya Amini[4] -*1, 2,4. Department of Horticultural Science, Faculty of Agriculture, Urmia University, 3. Research Department of Chromatography, Iranian Academic Center for Education, Culture and Research (ACECR), Urmia. E-mail: a.hassani@urmia.ac.ir*

Daphne mucronata is a shrub belonging to the Thymelaeaceae family that is known as a medicinal plant in various parts of Asia. Daphne flowers, leaves and fruits are a rich source of important natural compounds, which are used to various diseases such as cancer, rheumatism, arthritis and muscle swelling. Geographical distribution of this species has been reported in several regions of Iran. The aim of this study was to investigate the phytochemical compounds in flowers, leaves and fruits of three samples collected from Mirabad, Qaleh Rash and Dige regions located in Sardasht, West Azerbaijan province. The results showed that there was a significant difference between samples collected from different regions for total phenol of flower (0.91-1.63 mg GAE g^{-1} DW), total phenol of leaf (0.43- 0.97 mg GAE g^{-1} DW), total phenol of fruit (1.78-1.91 mg GAE g^{-1} DW), total flavonoid of flower (0.12-0.42 mg QE g^{-1} DW), total flavonoid of leaf (0.0032-0.0045 mg QE g^{-1} DW), total flavonoid of fruit (0.132-0.323 mg QE g^{-1} DW), antioxidant activity of flower (72.45-88.28%), antioxidant activity of leaf (52.06-77.9%) and antioxidant activity of fruit (60.6-67.64%) by DPPH method. The highest amount of total flower and fruit phenol, total flower and leaf flavonoids and fruit antioxidant activity in Mirabad sample, the highest amount of total leaf phenol, total fruit flavonoids and leaf antioxidant activity in Qaleh Rash sample and the highest amount of flower antioxidant activity were observed in Dige sample. The leaf samples had lower total phenols and flavonoids than flower and fruit samples. Overall, the findings of this study showed that there is a significant phytochemical diversity between the samples collected from different regions.
Keywords: Antioxidant activity, *Daphne mucronata*, Total flavonoid, Total phenol

PP19 Micro-Morphology Of Fruit In Some Species Of Asteraceae To Identify The Real Chamomile

Minoo Ramezanali aliakbar[1], Maneezheh Pakravan[1]*, Ali Sonboli[2] -1. *Faculty of Biologial Science, Alzahra University, Tehran, Iran, 2. Department of Biology, Medicinal Plants & Drugs Research Institute, Beheshti University, Tehran, Iran. E-mail: pakravan@alzahra.ac.ir*

Chamomile (a generic name for *Anthemis nobilis* L.) is one of the oldest known medicinal herbs. *A. nobilis*, commonly is famous as real chamomile, is a beautiful and fragrant plant that often grows on the grass and sandy ground. Chamomile is an endemic plant of the Mediterranean region, but its originated from Asia Minor. Today, it is widely distributed in Europe, Africa, America and Australia, and Iran. Its species are found in the Irano-Turanian region. Chamomile flowers are useful in the pharmaceutical, cosmetic and food industries, due to their essential oils such as anthemine, tannin, phytosterol and Anthemique acid. Other species of *Tripleurospermum*, *Matricaria* and *Tanacetum* that are morphologically similar to *A. nobilis*, including *Tripleurospermum disciforme* (false chamamilla), *Matricaria chamamilla* (German chamomile) and *Tanacetum parthenium* (feverfew), are available in the market, but only two species of *A. nobilis* and *M. chamamilla* have medicinal properties. These species are diverse in floral structure, shape and color of

leaves, and trichomes on their stem, but it is difficult to classify them only with these characteristics. Current study aimed to present the micromorphological characters of achene and classify different chamomile species. The species were investigated using stereo microscope and electron microscope(SEM). Our results showed that presence of gland, rib, corona and different sculpturing on achene could providing characters to separate species from each other. Also it was demonstrated that micromorphological characters of achene are a better way to identify real chamomile than other similar species to extract active compounds for using the medicinal properties.

Keywords: Medicinal plants, *Tripleurospermum*, *Matricaria*, *Tanacetum*, Achenes

PP20 Investigation of some morphological characteristics of two native barley cultivars in Sistan region under Drought stress

Leila Fahmideh[1 *], Ayoub Mazarie[2], Parisa Pahlavan[3], Shahin Madadi[4] -*1. Associate Professor of Department of plant Breeding and Biotechnology, University of Zabol, Zabol, Iran; Gorgan University of Agricultural Sciences and Natural Resources, Gorgan, Iran, 2. Ph. D. student of Biotechnology, University of Zabol, Iran,3. M. Sc. student of Biotechnology, University of Zabol, Iran,4. Ph. D. student of plant Breeding, University of Zabol, Iran. E-mail: l.fahmideh@uoz.ac.ir*

Drought is an important environmental limiting factor for products around the world. Barley is one of the plants that is cultivated due to adaptation of its genotypes to different environmental conditions and different aspects of its consumption in vast regions of the world with different climatic conditions. In present investigation, to study the effects of drought stress on growth and morphological parameters on two cultivars native to Sistan region (Nimroz and Nomar). , This experiment was performed as a factorial in a completely randomized design with three replications in 2020 at the Faculty of Agriculture, University of Zabol. The experimental treatment was included drought stress (irrigated in Field capacity, depletion of soil water content up to 50% and 75% of FC condition). The studied traits were included the root length, stem length, fresh and dry weight of shoot, fresh and dry weight of root. The results showed that drought stress had a significant effect at the level of one percent on all morphological studies,so that with applying drought stress, the root length increased, and stem length, fresh and dry weight of aerial parts, fresh and dry weight of root decreased. The results of comparison of mean data showed that the soil's water content lose to the 75% of the field capacity led had the greatest effect among the studied drought stress levels and caused the greatest increased in root length and also the greatest decreased in stem length, fresh and dry weight of shoots, fresh and dry weight of roots. Based on the results between the two studied cultivars, Nimroz cultivar was superior to Nomar cultivar in drought stress conditions.

Key word: Nimroz and Nomar barley cultivars,Root characteristics, drought stress levels

PP21 Effect of BAP and 2-4-D hormones on the amount of phenolic and flavonoid Compounds of *Hypericum perforatum* calli *in vitro* conditions

Leila Fahmideh [*1], Amir Rajabi[2], Ayoub Mazarie[3] -*1. Associate Professor of Department of plant Breeding and Biotechnology, University of Zabol, Zabol, Iran; Gorgan University of Agricultural Sciences and Natural Resources, Gorgan, Iran, 2, 3. Ph. D. student of Biotechnology, University of Zabol, Iran. E-mail: l.fahmideh@uoz.ac.ir*

Plants are able to produce some valuable bioactive compounds, such as phenolic compound *in vitro* conditions .Polyphenols and phenolic compounds are plant secondary metabolites, which have antioxidant activity. *Hypericum perforatum* (Hypericum; Hypericaceae) an important medicinal plant and are used in the pharmaceutical industry. Extracts and compounds from plants belonging to this family have important properties such as antidepressant, antibacterial, anti-cancer and anti-inflammatory. In 2020, to evaluate the effects of benzyl amino purine (BAP) and 2,4-Dichloro phenoxy acetic acid (2-4-D) Hormones on values of phenol and flavonoids of calli from the leaf explants of *H. perforatum*, an experiment was performed at the University of Zabol a factorial in a completely randomized design with three replication. In the present study, the amount of phenolic and flavonoid compounds in calli extracts obtained on MS medium containing different concentrations of 2-4-D (0.5 and 1 mg/L^{-1}) and BAP (0.5 and 1 mg/L^{-1}) hormones were determined by Folin-Ciocaltiu and Aluminum Chloride colorimetric methods, respectively. The results of mean comparison showed that the highest amount of flavonoids (11.27 mg/gDW) and phenol (22.15 mg/-gDW) was obtained from MS medium containing 1 mg/l-1 BAP+0.5 mg/l-1 2.4-D. Consequently, these

results can provide that by optimizing the concentrations of Elicitors such as BAP and 2-4-D hormones, on the calli of the medicinal plant *H. perforatum*, the production of secondary metabolites of this plant can be increased *in vitro*.

Keywords: Optimization, Hormone treatments, Tissue Culture, Leaf explant

PP22 Effect of time and concentration of salicylic acid foliar application on lavender polyphenol oxidase activity

Fateme Nazari [1], Forough Sanjarian [2*], Ramazan Ali Khavari Nejad [1], Hanieh Jafari [1] -*1. Departmant of biochemistry, Science and Research branch, Islamic Azad University, Tehran, Iran. 2. Plant Bio-product Group, National Institute of Genetic Engineering and Biothechnology (NIGEB), Tehran. Iran. E-mail: fsanjarian@nigeb.ac.ir*

As a growth regulator, salicylic acid has a variety of physiological functions in plants. Recent studies indicate that the presence of salicylic acid increases plant resistance to stress factors. The activity of salicylic acid is highly dependent on the production of reactive oxygen species. Reactive oxygen species act as messenger molecules that their dual function is strongly dependent on the concentration of them in the cell. At low concentrations Reactive oxygen species are involved in the cascading pathways of plant protective reactions, including the activation of antioxidant enzymes and protein kinase signaling pathways. However, in high concentrations they are harmful to the cell and lead to programmed cell death and apoptosis, which must be rapidly eliminated from the cell by antioxidant enzymes. Lavender with the scientific name of *Lavandula officinalis* belongs to the genus Lamiaceae and belongs to the genus Lavandula. Lavender is a perennial, evergreen and very fragrant plant with woody stems. Lavender essential oil contain high amount of terpenes and has sedative, carminative, antiseptic, analgesic and antimicrobial properties. Lavender is an important and high demand part of the essential oil industry. This essential oil is used in a large number of personal care products. In this study, lavender plants were sprayed in three replications at 10-day intervals with different concentrations of salicylic acid (0, 0.2, 0.5 and 1 mM). Then, its effect on the activity of the antioxidant enzyme polyphenol oxidase was investigated. Statistical analysis of the results showed that time did not have a significant effect on enzyme activity but the effect of concentration was significant. The highest amount of enzyme activity was obtained after the first foliar application with a concentration of 0.2 mM. It seems that over time the plant physiology adapts to salicylic acid treatment.

Keywords: Plant Hormones, Medicinal Plant, Antioxidant enzymes

PP23 Identification of CBL gene family in halophyte grass *Aeluropus littoralis*

Mozhdeh Arab[1], Hamid Najafi Zarrini[1], Ghorbanali Nematzadeh[2], Seyyed Hamidreza Hashemipetroudi[2*] -*1. Department of Biotechnology and Plant Breeding, Sari Agricultural Sciences and Natural Resources University (SANRU), 2. Department of Genetic Engineering and Biology, Genetics and Agricultural Biotechnology Institute of Tabarestan (GABIT), Sari Agricultural Sciences and Natural Resources University (SANRU). E-mail: shr.hashemi@sanru.ac.ir; irahamidreza@yahoo.com*

The whole genome sequencing (WGS) of halophyte grass Aeluropus littoralis has generated valuable genomic resources to study the characteristics of gene families involved in various abiotic stresses such as salinity and drought stress. Calcineurin B-like proteins (CBLs) as a secondary messenger molecule belong to calcium sensors superfamily, which play a key role in regulating physiological processes, plant growth and development. In this study, the CBL gene family of *Aeluropus littoralis* and *Arabidopsis Thaliana* as two glycophytes and halophytes plant model were studied. Based on sequence homology and orthology/paralogy relationships with *Arabidopsis* genes, six CBL genes were identified in the *Aeluropus* genome, and were classified into three protein groups: *AlCBL4*, *AlCBL2* and *AlCBL10*. Protein domain analysis of the *AlCBL* gene family confirms the presence of four EF-hand domains in all of these genes, which provide a structure for calcium ion binding. The high similarity of the physicochemical properties of most *Aeluropus* proteins to *Arabidopsis* as well as the strong orthological relationship with each other may indicate the preservation of the function of these genes in the evolutionary process. Different expression profiles of *AlCBLs* in *Aeluropus* transcriptome also be an evidence for the functional divergent of these genes. The results obtained in this study can provide valuable information about the properties of this gene family and their functional roles for future studies

Keywords: Calcium sensor, halophyte, abiotic stress, EF-hand domain

PP24 Study of genus *Ceratophyllum* L. based on morphological, anatomical and molecular marker features in Iran

Masoomeh Ghasemi Veshareh, Shabnam Abbasi[1], Saeed Afsharzadeh[1*]-*1. Department of Plant and Animal Biology, Faculty of Biological Science and Technology, University of Isfahan. E-mail: s.afshar@sci.ui.ac.ir*

The genus *Ceratophyllum* belongs to Ceratophyllales and Ceratophyllaceae. Two species of this genus have been reported in the Iranian plateau. This genus is an aquatic submerged plant. Regarding the importance of *Ceratophyllum* due to pharmaceutical and bioenvironmental usages and the value of understanding species diversity, in this study species of this genus was examined by morphological, anatomical and molecular characters. For this purpose, sampling were done from two species of this genus including 19 poulations of *C. demersum* with distribution in throughout of Iran (north, northwest, center and southeast) and 4 populations of *C. submersum* with distribution in north and southwest of country. Twenty six quantitative and qualitative morphological characters were selected and a dendrogram was drowned. Cross section of leaves and stems were stained and observed by light microscope. The morphological characters of flowers, fruits and leaves and anatomical characters such as central parenchyma in the stems and number of aerenchyma in leaves demonstrated higher variation in different populations of two species. Also for genetic diversity of different populations, 10 SRAP primers were used. The molecular results showed higher genetic variation within populations than between populations and central populations were separated from other populations. Different used characters in this study were important for identification and delimitation of species in this genus.

Keywords: Horn leaf, Morphology, Intraspecific Diversity, Ceratophyllaceae, SRAP

PP25 Effect of Fe_2O_3 on growth, relative water content and flavonid content of *Matricaria chamomilla* extract

Zeinab Rastegaran[1], Halimeh Hassanpour[2*], Hakimeh Ziyadi[1] -*1. Department of Organic Chemistry, Faculty of Pharmaceutical Chemistry, Medicinal Sciences, Islamic Azad University, Tehran, Iran, 2. Aerospace Research Institute, Ministry of Science Research and Technology, Tehran 14665-834. Iran. E-mail: hassanpour@ari.ac.ir*

Matricaria chamomilla is a medicinal plant belonging to Asteraceae family and has antioxidant, anti-inflammatory and anti-cancer properties. Nanoparticles have small size and high surface area which are absorbed highly by cells. Recently, nano-macro and micro nutrients are used to increase agricultural production. In this study, sterilized seeds were put in *Murashige* and Skoog medium containing different concentrations of Fe_2O_3 nanoparticles and transferred to the growth chamber with a 25±2 °C temperature, 45% humidity and light conditions of 3000 lux. After 4 weeks of culture, seedlings subjected to various biochemical and physiological analyzes. Results showed that nanoparticles at 25 mg L^{-1} induced seedling growth and with increasing of nanoparticle concentrations, growth parameters decreased. The relative water content showed an 19.46% increase at 25 mg L^{-1} nanoparticles compared to the control. Flavonoid content was higher in the methanolic extract of leaves than the roots and increased at 25 and 50 mg L^{-1} compared to the control. The highest flavonoid content was observed at 25 mg L^{-1} which showed an 50.13 and 84.32% increase in leave and roots compared to the control, respectively. The results of this study indicated the beneficial effects of iron nanoparticles in the proper concentration on growth and flavonoid content of *M. chamomilla* seedlings.

Keywords: Methanolic extract, *Matricaria chamomilla*, In vitro condition, Secondary metabolite

PP27 Effect of magnetic field and light spectrums on the growth and antioxidant capacity of *Hyoscyamous reticulatus* callus tissue

Masoumeh Majma Sanaye[1], Halimeh Hassanpour*[2], Hakimeh Ziyadi[1] -*1. Department of Organic Chemistry, Faculty of Pharmaceutical Chemistry, Medicinal Sciences, Islamic Azad University, Tehran, Iran, 2. Aerospace Research Institute, Ministry of Science Research and Technology, Tehran, Iran. E-mail: hassanpour@ari.ac.ir*

Hyoscyamus reticulatus L. is a medicinal plant belonging to Solanaceae family and has analgesic, antispasmodic and antichlorogenic capacities. Magnetic field (MF) is an abiotic stress which is used as a

technique in biological studies such as modification of antioxidant capacity and medicinal metabolites. Light spectrums are as a suitable light source for plant growth and can induce plant growth and development. In this study, sterilized seeds were put in *Murashige and Skoog* (MS) medium. For callus induction, hypocotyl explants were placed in MS culture medium containing 2, 4-D = 0.5 mg L^{-1} and BA = 0.5 mg L^{-1} hormones. After 3 weeks, the calli were subcultured under different MF intensities (0 and 4 militesla (mT). Then, calli were transferred to the growth chamber and subjected to different light spectrums in four treatments (control, MF, red-blue (RB), MF + RB). The results showed that RB light induced fresh weight of callus tissue (18.3%), and the highest fresh weight (60.11%) was obtained under RB+MF spectrum. MF treatment caused a significant increase in growth index which induced an 75.88% raise comparing to the control. Free radical scavenging activity (DPPH) increased under the influence of MF and RB spectrums, and the highest DPPH activity (84.7%) was observed in the MF treatment with an 31.8% increase compared to control. It seems that the MF with the regulation of antioxidant defense system can induce the growth of callus tissue.

Keywords: Red-blue light spectrum, Fresh weight, Radical scavenging activity

PP28 Male and Female Gametophyte Development in *Artemisia aucheri* B. (Asteraceae)

Elham Ghasemi noor[1], Abdolkarim Chehregani Rad[1], Mohammad Doostali[1], Fariba Mohsenzadeh[1], Mahsa Aminsalehi[1*] - *1. Department of Plant Science, Faculty of Sciences, Bu-Ali Sina University, Hamedan, Iran. E-mail: A.masha@sci.basu.ac.ir*

The genus *Artemisia* belonging to the Asteraceae family and is the largest genus of the Anthemideae tribe, which is widely used in medicine due to Artemisinin. The Asteraceae family has been used for various studies due to their interesting evolutionary and developmental characteristics, some of which have been very limited studies. For this purpose, to study the growth stages of male and female gametophytes, flowers and buds were prepared at different growth stages and after stabilization with 70% FAA, the samples are stored in 70% ethanol. Then, to prepare for histological studies, they were placed in paraffin wax and stained with hematoxylin-eosin, and sectioned with a microtome. Histological analysis showed that the anther is tetrasporangiate and also the anther wall is composed of 4 layers including epidermis, endothelium, middle layer, and tapetum. Tetrahedral microspore tetrad was observed in this genus. Besides, pollen grains are tricolporate with have a spherical shape in equatorial view and a three-lobed in polar view. Accordingly, pollen and anther development follow the standard pattern of dicotyledonous plants. Other results demonstrated that anther tapetum is of the secretory type with polyploidy cells. Based on the results of this study, the ovule is anatropous. The largest megaspore at the chalazal pole becomes the functional megaspore. Meiosis cause to form T-shaped or linear tetrads. Embryo sac development is of *Polygonum* type.

Keywords: Asteraceae family, Artemisia, Male and Female gametophyte, Developmental biology

PP30 Evaluation of phenolic and flavonoid compounds in callus from leaf explant of *Teucrium polium* L. under hormonal condition BAP and IAA

Zahra Mohammadzadeh[1], Monireh Cheniany[1]*, Leila Samiei[2] -*1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran, 2. Research Center of Plant Science, Ferdowsi University of Mashhad, Mashhad, Iran. E-mail: Cheniany@um.ac.ir*

This study aimed to investigate the callus potential and phenolic production of *Teucrium polium* leaf explant in MS culture medium containing BAP and IAA hormones. Leaf explant was isolated and sterilized from plants grown under hydroponic cultures. The middle cuttings of leaf cultured on media with single and combined hormones BAP (0, 0.5, 1, and 1.5 mg L^{-1}) and IAA (0, 0.1, 0.5, and 1 mg L^{-1}) and after eight weeks, the percentage of callus, fresh and dry weight of them as well as phenolic and flavonoid contents were measured. Different levels of hormones had various effects on the callus induction of explant so that the highest percentage of callus (100%) related to the combination of "$IAA_{0.1}$ + BAP_1" and "IAA_1 + $BAP_{1.5}$" while the lowest percentage of callus (73%) was in the treatment of "$IAA_{0.1}$ + $BAP_{1.5}$". The highest fresh and dry weights belonged to the callus created on the culture medium with the combined hormone "IAA_1

+ $BAP_{1.5}$". The highest content of phenol and flavonoid were obtained in the hormonal treatments of "IAA_1 + $BAP_{1.5}$" Considering there are more than 63% of medicinal plants in our country and in order to prevent the destruction of these valuable and natural plants, it is recommended to research on the potential of callus formation, regeneration, and seedling production in vitro.

Keywords: *Teucrium polium,* Benzyl amino purine, Indole acetic acid, Callogenesis, Phenol derivatives

PP31 Evaluation of phenolic metabolites and antioxidant capacity of aerial part and root from two subspecies of medicinal plant *Ziziphora clinopodioides* Lam.

Azadeh Taheri [1], Monireh Cheniany[1*], Ali Ganjeali [1], Afsaneh Arefi-Oskouie [2] -*1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran, 2. Department of Basic Sciences, Faculty of Paramedical Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran. E-mail: Cheniany@um.ac.ir*

Plants can produce a large group of organic compounds called secondary metabolites that are mainly consumed by humans as medicinal compounds. Ziziphora clinopodioides is an edible medicinal plant used as a wild vegetable or additive in foods to offer aroma and flavor. This plant is also used to treat heart disease, high blood pressure, edema, cough, bronchitis, lung abscess, and other diseases such as cold and flu, infectious diseases, and inflammation. In this study, the aerial part and root of two subspecies of Z. clinipodioides belong to "Tymourtash Village" (Z. clinipodioides subsp. bungeana) and "Hezar Masjed Mountains" (Z. clinipodioides subsp. filicaulis) were sampled to investigate the phenolic metabolites. The content of total phenols and phenolic acids were measured based on spectrophotometric technique and antioxidant potentials were evaluated based on DPPH and FRAP assays. It was found that total phenols and phenolic acids in the roots of Z. clinopodioides subsp bungeana (2.752 and 0.818 mg g^{-1} DW, respectively) were more than in comparison to its aerial parts (2.623 and 0.120 mg g^{-1} DW, respectively). Although the same situation was also observed for root and aerial part of Z. clinipodioides subsp. filicaulis, the level of these compounds was lower as compared to Z. clinopodioides subsp bungeana. The results of antioxidant capacity also showed a significant difference in the extracts of two organs of the studied subspecies. Accordingly, it can be concluded that the production capacity of phenolic metabolites differs in various Z. clinopodioides subspecies. This matter would be the basis to suggest the plants with more metabolites for the food- pharmaceutical industry.

Keywords: Ziziphora clinopodioides, Secondary metabolites, Phenolic acids

PP32 The effect of chitosan on antioxidant activity and secondary metabolites in medicinal plant *Dracocephalum kotschyi*

Samaneh Kahromi[*1], Jalil Khara[2] - *Department of Biology, Faculty of Science, Urmia University, Iran. E-mail: Kahromi.s@gmail.com*

A wide variety of secondary metabolites are synthesized from primary metabolites by plants which had a vast range in the pharmaceuticals, food additives and industrial applications. In recent years the use of elicitors has opened a novel approach for the production of secondary metabolite compounds. *Dracocephalum kotschyi* is valuable herb because due to pharmaceutical compounds like Rosmarinic acid (RA), Quercetin and Apigenin. The current study, foliar application of chitosan (0, 100, 400 mg/l) as elicitor was used to increase medicinal componds in *D. Kotschyi*. Foliar spray of chitosan on H_2O_2 content, amount of phenolics, flavonoids, Rosmarinic acid, Apigenin and the activity of antioxidant enzymes and L-phenylalanine ammonia- lyase (PAL) were investigated. After chitosan treatment, increased amounts of hydrogen peroxide (H_2O_2) that enhanced activity of antioxidant enzymes (gauical peroxidase and catalase). The application of chitosan significantly increased content of phenol and flavonoid. Also chitosan increased PAL activity that resulted in enhanced Rosmarinic acid content (up to 13-fold). Content of Apigenin (anticancer flavonoid) showed 16-fold enhance compared to the control plants. Chitosan can play a main signaling role in the activation of many plant defense responses and maybe affected the gene regulation and enzymes activity in metabolic pathway linked with the biosynthesis of special secondary metabolites. Therefore, chitosan was found to be a very effective elicitor that treatment of *D. kotschyi* leaves by chitosan caused huge increase in induction and production of important pharmaceutical compounds such as Rosmarinic acid and Apigenin.

Keywords: Elicitor, Pharmaceutical compounds, Phenol, Rosmarinic acid

PP33 Evaluation of the effects of zataria multiflora in the treatment of uterine infection on abortion of pregnant cows

Seywan Veysi[1*], Abolfazl Hajibemani[2] -1. *DVM student, Faculty of Veterinary Medicine, University of Tabriz, Tabriz, Iran,* 2. *Department of Clinical Sciences, Faculty of Veterinary Medicine, University of Tabriz, Iran*. *E-mail: Sirwan.vaisi1368@gmail.com*

Postpartum uterine infection is one of the most common postpartum uterine diseases in dairy cows. Zataria multiflora is a plant in the mint group that disrupts the menstrual cycle and should not be consumed in large quantities during pregnancy. The aim of this study was to evaluate the effects of Zataria multiflora in the treatment of uterine infection and its subsequent effects on abortion of pregnant cows. In this study, 48 cows were selected and randomly divided into three groups. 6 cows in the first group (control), treated with Placebo, 19 cows in the second group treated with the antibiotic of penicillin + streptomycin and 23 cows in the third group were treated with Zataria multiflora extract. The diagnosis of uterine infection was done 30 to 35 days after parturition. Treated cows were inseminated and at 30 days post-insemination, pregnancy was diagnosed using ultrasonography. Statistical analysis was performed using SPSS software. With the evaluation of the data, no abortion was in the control group (0%), in the group treated with the antibiotic of penicillin + streptomycin, 10.5% and in the group treated with Zataria multiflora 34.8% had an abortion. The results of the study, although did not show a significant difference between the groups, but due to the high percentage of abortions in the Zataria multiflora group and the near significance of the results of the evaluations ($p = 0.066$), thyme consumption should always be used with caution during pregnancy.

Keywords: Zataria multiflora, Uterine infection, Abortion

PP34 The effect of exogenous melatonin on physiological parameters of quinoa under salt stress

Fatemeh Daneshmand[1*], Shima Habibi Badrabadi[2], Amir Abbas Minaeefar[1] -*1.Biology Department, Payame Noor University, Tehran, Iran, 2.M.Sc of Plant Physiology, Payame Noor University, Taft, Iran. E-mail: f.daneshmand@yahoo.com*

This research has investigated the effect of exogenous melatonin (0 and 0.5µM) on the growth, biochemical and physiological parameters of quinoa plant (Rosada), under salt stress (0 and 100mM). The results showed that salinity stress in the concentration of 100 mM lead to reduction of plant growth parameters such as Shoot length, shoot diameter, root length, Shoot dry weight, Root dry weight, Shoot fresh weight and Root fresh weight. Also, stress caused increase of sodium ion and decrease of potassium ion and the ratio of potassium to sodium decrease in the plant. On the other hand, the amount of total chlorophyll and protein decreased. The amount of carotenoids has not had significant different than the control. The mount of malondialdehyde, hydrogen peroxide and lipoxygenase activity increased under salinity stress. In addition, non-enzymatic antioxidants such as total ascorbate and glutathione and the amount of soluble carbohydrates, proline, phenolic compounds, flavonoids and anthocyanins increased significantly under stress. Antioxidant enzymes such as superoxide dismutase, catalase, peroxidase, ascorbate peroxidase, glutathione reductase and phenylalanine ammonialyase increased. Melatonin pretreatment has led to significant increase of total chlorophyll, carotenoids, soluble carbohydrates shoot and root proline, protein, total ascorbate and total glutathione. Also, all antioxidant enzymes in this research increased in the presence of melatonin under salinity stress. Therefore, the concentrations of malondialdehyde and hydrogen peroxide decreased. Exogenous melatonin application seems to be a suitable solution to reduce oxidative stress in quinoa and improve growth parameters.

Keywords: Enzymatic Antioxidants, Non-Enzymatic Antioxidant, Oxidative Stress

PP35 Effects of UV radiations on growth and some physiological and biochemical parameters of *Portulaca oleracea* L.

Elham Iziy[1*], Ahmad Majd[2], Mohammad Reza Vaezi-Kakhki[3] – *1. Department of Biology, Science and Research Branch, Islamic Azad University, Tehran, Iran, 2. Department of Biology, Faculty of Life Sciences, North Tehran Branch, Islamic Azad University, Tehran, Iran, 3. Department of Biology, Faculty of Sciences, Hakim Sabzevari University, Sabzevar, Iran. E-mail: elhamiziy@gmail.com*

The increased effects of UV radiation are observed as a result of the reduced ozone layer with increasing atmospheric pollution. The aim of this study was to investigate the effects of UV radiations on growth and some physiological and biochemical parameters of *Portulaca oleracea* L. Experiments were performed under controlled greenhouse conditions using a completely randomized design with three replications. Purslane plants were treated with UV rays (UV-A at three times 20, 40 and 60 minutes, UV-B at three times 20, 40 and 60 minutes, and UV-C at five times 10, 20, 30, 40, 60 minutes). The results indicated that changes in root growth were not significant, but shoot length, wet and dry weight of plant increased compared to control in the three groups treated with 60 min UV-A, 60 min UV-B and 10 min UV-C. the treatment with 60 min UV-B increased the activity of defense enzymes, phenolic, flavonoid and antioxidant contents significantly more than the other UV treatments. In general, the results indicate that the purslane plant is sensitive to UV radiation. However, applying controlled UV light can provide a new alternative strategy to increase crop productivity, that is the same application of 60 min UV-B as a novel plant growth booster, in comparison with UV-A and UV-C treatment.

Keywords: Antioxidant, flavonoid, pigment, UV-B

PP36 Effects of zinc oxide nanoparticles on enzymatic and nonenzymatic ntioxidant content, germination, and biochemical and ultrastructural cell characteristics of Portulaca oleracea L.

Elham Iziy[1*], Ahmad Majd[2], Mohammad Reza Vaezi-Kakhki[3] -*1. Department of Biology, Science and Research Branch, Islamic Azad University, Tehran, Iran, 2. Department of Biology, Faculty of Life Sciences, North Tehran Branch, Islamic Azad University, Tehran, Iran, 3. Department of Biology, Faculty of Sciences, Hakim Sabzevari University, Sabzevar, Iran. E-mail: elhamiziy@gmail.com*

This report focuses on the application of zinc oxide nanoparticles (ZnO NPs) carrying phycomolecule ligands as a novel plant growth promoter aimed at increasing the crop productivity of purslane (*Portulaca oleracea* L.). Experiments were performed under controlled greenhouse conditions using a completely randomized design with nine replications. Purslane seeds were treated with four concentrations of ZnO NPs (0, 10, 100, and 500 mg L^{-1}) and four concentrations of bulk ZnO (0, 10, 100, and 500 mg L^{-1}). The ultrastructural characteristics of the leaves of the plants treated with of 500 mg L^{-1} ZnO NPs were determined using transmission electron microscopy (TEM). The results indicated that the treatment with ZnO NPs increased the content of chlorophyll *a* and chlorophyll *b*, carotenoids, and total phenolic and flavonoid compounds significantly more than the treatment with bulk ZnO. Our findings also showed that the application of high concentrations of ZnO NPs is the most effective strategy to considerably induce the antioxidant capacity and enzymes of purslane plants. Furthermore, the seed germination percentage and sprout growth rates were significantly higher in the plants treated with 500 mg L^{-1} of ZnO NPs (100% ±0.00), compared to the control plants (93.33% ±1.66). The TEM images revealed the concentration of ZnO NPs and cell membrane rupture, as well as a deformation in the shape of chloroplasts and a decrease in their number in the plants treated with 500 mg L^{-1} ZnO NPs, compared to the control plants. Owing to their toxicity, high concentrations of ZnO NPs lead to oxidative stress in plants. Thus, our findings provide a new alternative strategy for increasing crop productivity, i.e., the application of ZnO NPs as a novel plant growth booster, in comparison with the bulk ZnO treatment.

Keywords: photosynthetic pigments, peroxidase, catalase

PP37 Micromorphologic study of flowers and seeds in *Amaranthus* subgen. *Amaranthus* sect. *Amaranthus* from Iran

Atiye Nejad Falatoury[1*]- *1. Department of Botany, Iranian Research Institute of Plant Protection, Agricultural Research, Education and Extension Organization (AREEO), Tehran, Iran. E-mail: a.falatoury@areeo.ac.ir*

The genus *Amaranthus*, with about 75 to 95 species, is more distributed in temperate and tropical regions of the world. Species of this genus are considered from various aspects of agriculture as food, medicinal plants and important weeds. The genus *Amaranthus*, with 14 species in two subgenuses is distributed in Iran. From Iran, in each subgenus, there are members of two sections. Six species (*A. caudatus*, *A. cruentus*, *A. hybridus*, *A. hypochondriacus*, *A. powellii* and *A. retroflexus*) from sect. *Amaranthus* have been reported from Iran so far. Due to morphological diversity and hybridization between these species, accurate identification of these taxa is difficult and requires study and attention to different morphological characteristics. Therefore, in this study, an attempt has been made to facilitate the separation of these taxa from each other by accurately describing the reproductive traits related to inflorescences, flowers and seeds. The predominant form of the inflorescence in the sect. *Amaranthus* species is the terminal inflorescence, but axial form are also scattered throughout all of these plants. The distinct difference between *A. hybridus* and *A. powellii* is in the length of their leaves. In addition, the smaller seeds in A. powellii, despite the similarity of the two species, help to distinguish them. Also, the length ratio of *A. hypochondriacus* bracts to its tepals is more than *A. caudatus* and *A. cruentus* and its seeds are clearly larger. A. retroflexus is distinguished from the rest of the species in this section by its long, acute bracts and often having tepals with emarginate or retuse tips.

Keywords: Amaranthaceae, Flora of Iran, Morphology, Weed

PP38 Effect of arsenic tri- oxide on germination and seedlings growth in alfalfa (*Medicago sativa*)

Farnoosh Zargari[1*], Latifeh pourakbar[1], Seyed Yahya Salehi-Lisar[2], Jafar Razeghi[2], Rouhollah Motafakker Azad[2] *-1. Biology Department, Sciences Faculty, Urmia University, Urmia, Iran, 2. Plant Sciences Department, Natural Sciences Faculty, Tabriz University, Tabriz, Iran. E-mail: farnooshzargari@yahoo.com*

Environmental pollution by arsenic is a global problem that is related to agriculture and organsims health. According to the previous studies, arsenic is toxic to the most plants and causes physiological and biochemical changes in them. Furthermore, its entrance to the food chains, can threat human health. The aim of this study was to investigate, effect of different concentrations (0, 5, 10, 15 and 20 mg l^{-1}) of arsenic tri-oxide (As^{3+}), on germination percentage, germination rate, seedling vigor index and seedling length of alfalfa, during 10 days in the laboratory. In this way, the experiment was conducted as a completely randomized design in three replications for each concentration of As^{3+}, and was performed in petri dishes containing wet filter paper and healthy, homogeneous sterilized alfalfa seeds. Data analysis was done by Tukey test. The results of experiments showed, with increasing concentration of the treatment, the percentage and the rate germination decreased significantly ($P \leq 0.05$) .The highest decrease related to these parameters (98.28% and 97.75%, respectively), was recorded in the highest level of the treatment. At levels over 5 mg l^{-1}, Seedlings growth stopped and the seedling vigor index became zero. Based on the results, it can be concluded that arsenic, especially at high concentrations, inhibits alfalfa seedlings growth by interfering with metabolic processes. It seems, Arsenic has reacted with tissue enzymes and proteins and possibly has disrupted enzymatic activity and energy synthesis that eventually led to seed tissue death and inhibition of germination. As well as, the lack of adequate defense mechanisms at germination stage, can be a reason for the alfalfa greater sensitivity to arsenic toxicity at this stage. In order to have a comprehensive understanding of the arsenic effect on seed viability, it should be considered ROS, RNS and seed hormones interactions with arsenic. Field studies are also recommended.

Keywords: Crop plants, seed development, metalloid, stress

PP39 The study of cytotoxic effects of the gum of *Ferula gummosa* on PC-3 cells

Fateme Eizadifard[1], Majid Tafrihi[*1] -*1. Department of Cellular and Molecular Biology, Faculty of Science, University of Mazandaran. E-mail: m.tafrihi@umz.ac.ir*

The genus *Ferula* is composed of 180 species, including 15 species are endemic of Iran, 9 endemic species of Turkey, 7 Chinese endemic species and one Italian endemic Sepices and remainder grow in other countries. *Ferula* species are rich of different compounds including Sesquiterpene coumarins, Sesquiterpenes, Sesquiterpenes coumarin glycosides and sulfur containing compounds. According to studies, Ferula genus has different activities such as anticancer, anti-bacterial, anti-fungal, anti-epileptic and anti-oxidant. *Ferula gummosa* grows in different parts of Iran. In the past, it used to reduce abdominal pains, It is used as laxative and also to treat Rheumatism and diabetes. F.gummosa has a milky white gum resin extraction from the roots and stems. In this study, we investigated the cytotoxic effect of *F. gummosa* on PC-3 cells. After preparation of the gum of *F.gummosa*, PC-3 cells were treated with different concentrations of the gum for 48 hours. The IC50 value of the gum for PC-3 cells was calculated to be 9.14 µg/ml. The DNA fragmentation assay showed that10 µg/ml of the gum induced apoptosis in treated cells . The result of clonogenic assay showed a reduction in cell proliferation at concentrations of 4 and 6 µg/ml of the gum, and treatment of cells with 7 and 8 µg/ml of the gum led to more reduction in cell proliferation.

Keywords: *Ferula gummosa*, Cytotoxicity, Prostate cancer

PP41 Biochemical study of secretory compounds from germinating seeds of Clover and Fenugreek under cold stress

Maryam Ghannadnia* - *Department of Horticultural Sciences Engineering, Faculty of Agriculture and Natural Resources, Imam Khomeini International University, Qazvin, Iran. E-mail: ghannadnia@eng.ikiu.ac.ir*

Abstract: During germination, seeds of papilionaceae family secrete certain compounds to symbiosis with specific bacteria to stabilize nitrogen. In this study, the effect of cold treatment (10±2C˚) on the biochemical compounds secreted from the germinating seeds of Clover and Fenugreek compared to normal temperature (25±3 C˚). After fourteen hours, the seeds secretions were dried at room temperature then mixed with potassium bromide in a ratio of 1:100. The resulting tablets were studied by FTIR and their graphs were drawn using Excel software. Examination of the obtained peaks from the secreted compounds showed that Clover seeds were most affected than Fenugreek. The change in position of the FTIR peaks in the secreted samples showed the presence of different compounds. The strong bands at 3200- 3500 cm^{-1} indicated the presence of phenol and alcohols with free OH group. The vibrational peaks at 2800- 3000 cm^{-1} showed the presence of alkane group in lipid compounds. The bands at 1500- 1700 cm^{-1} reveal the protein compounds including COO^{-} group. The absorption peaks at 600- 800 cm^{-1} correspond to the =CH group of terpene compounds. Cold treatment increased the concentration of these compounds in the secreted composition of the both seeds, but this increase was more in Clover than Fenugreek. Additional studies are necessary to investigate the effect of cold treatment on the relationship between symbiosis of the roots of these plants with nitrogen-fixing bacteria.

Keywords: Papilionaceae family, Symbiosis, Concentration, Phenol

PP43 Improving the stability and solubility of the ornithine decarboxylase enzyme using rational design

Sayed Mojtaba Ghavami[*1], Fatemeh Rahimi[2] -*1. Former Msc student, Department of Agriculture, University of Ilam, Ilam, Iran, 2. Msc student, Department of Cellular and Molecular Biology and Microbiology, University of Isfahan, Isfahan, Iran. E-mail: mojtaba.ghavami@gmail.com*

Polyamines play an important role in free radical scavenging. Ornithine decarboxylase is an important enzyme in putrescine biosynthesis. Use of protein engineering to investigate possibility of increasing the solubility and stability of enzyme in drought stress conditions in order to maintain normal enzyme activity, can have a significant effect on improving plant resistance to stress conditions. For this purpose, prediction of thermodynamic stabilization, effects of potential mutations on the thermostability of the enzyme and prediction of dangerous mutations per amino acid were performed using Dezyme software and a systematic search and mutation susceptible points were identified. 10 points selected for mutation and applied

individually by Dynamut server. Then destabilizing mutations were ignored and only stabilizing mutations (K349R, D233F, P257Y, P412Y) in the form of multiple point mutations was applied. Results of protein stabilization were 2.726 Kcal/mol. Then Examination of amyloid and aggregation formation sites by FoldAmyloid and AGGRESCAN3D servers showed that the most amino acids involved in formation of amyloid are lysine, valine and (isolucin and tyrosine equally). Mutant enzyme with fewer lysine will be less likely to form amyloid. Also using Prot pi|Protein Tool server, isoelectric point and charge of protein was 5.90 and -15.792. Isoelectric point is far from the cytosolic pH of plant cells (7.4), and possibility of enzyme deposition in this medium is low. using Supercharge tool in Rosie server and AVNAPSA method and targeting final protein load on -17, solubility of enzyme increased. resulting Pdb file used in docking process to investigate the binding of enzyme to its cofactor (PLP). Using chimera software, the cofactor structure was optimized. Final docking results on engineered enzyme were obtained as 10 binding conformations with similar amounts of energy, indicating that cofactor binds to enzyme in these conformations and does not interfere with main function of enzyme after mutations.

Keywords: Putrescine, Stress, Engineered enzyme, Docking, Isoelectric point

PP44 Genome-wide identification, characterization and expression profiles of heavy metal ATPase (HMA3) in plants

Anahita Navai [1], Mona Hasan Zadeh Mohammadi [1], Ahmad Humayan Kabir [2*], Gholamreza Gohari [3] -*1. Department of Biology, Faculty of Sciences, University of Maragheh, Maragheh, Iran, 2. Molecular Plant Physiology Laboratory, Department of Botany, University of Rajshahi, Rajshahi 6205, Bangladesh, 3. Department of Horticultural Sciences, Faculty of Agriculture, University of Maragheh, Maragheh, Iran. E-mail: ahmad.kabirhomayouon@ru.ac.bd*

HMA (heavy metal associated) is a member of the ATPases protein family involved in metal transport in plants. This study characterizes several HMA3 homologs and infers their molecular functions in different plant species. Arabidopsis *AtHMA3* (AT4G30120) was used as a reference to retrieve 11 HMA3 homologs having 97-100% query cover, 535-542 residues, 56983 to 58642 (Da) molecular weight, and 5.74 to 8.16 pI value, 29.10 to 33.89 instability index, and 0.222 to 0.380 grand average of hydropathicity. Topological analyses showed 4 transmembrane domains in these HMA3 homologs positioned similarly in terms of cytoplasmic and non-cytoplasmic regions along with ~22-28% α-helices, ~22-28% extended strands, and ~50% random coils. HMA3 protein of *Arabidopsis lyrata* subsp. lyrata and *Eutrema salsugineum* are located at chromosome 2, while others are positioned at chromosome 4. All these HMA3 homologs are localized in the plasma membrane sharing a few common biological and molecular functions. Besides, these *HMA3* genes contain 8-9 exons in which promoter positions are varied among the homologs. The *cis*-acting elements of *HMA3* genes were projected to be involved with stress response, anaerobic induction, and light responsive regulation in plants. Three out of five motifs encode E1-E2_ATPase involved in proton-pumping in the plasma membrane. The *Arabidopsis thaliana* HMA3 protein clustered with *Camelina sativa* and *Capsella rubella* show a close phylogenetic relationship. Also, *AtHMA3* exhibits a close association with *AtHMA3* with *MTPA2*, *ZAT*, *NRAMP3*, *IRT2*, and *NRAMP2* under the local network of AtHMA3 linked to metal transport. Further, *AtHMA3* is most potentially expressed during senescence, germinating seed, seedlings, young rosette, bolting, and young flower. In addition, *AtHMA3* showed a significant upregulation (>6.0 fold) under Fe-deficiency. These findings may provide essential background to perform wet-lab experiments to understand the role of HMA3 in metal homeostasis.

Keywords: ATPases family, phylogeny, conserved motif, gene interactions, sequence homology

PP46 Physiological response of rice plant to foliar application of methyl jasmonate under salinity stress conditions in vegetative stage

Farhad Habibzadeh[1*], Seyyed Jaber Hosseini[2] -*1. Departmet of Genetics and Plant Breeding, Faculty of Agriculture and Natural Resources, Imam Khomeini International University, Qazvin, Iran, 2. Department of Agronomy, Faculty of Agriculture, Tarbiat Modares University, Tehran, Iran. E-mail: habibzadeh_f@eng.ikiu.ac.ir*

Jasmonic acid and its methyl ester, methyl jasmonate, are plant growth regulators that affect many physiological and biochemical processes in plants. On the other hand, salinity stress is one of the limiting factors of plant growth. Therefore, in order to investigate the effect of methyl jasmonate foliar application

and salinity stress on physiological characteristics of rice plant (Tarom local cultivar) in the vegetative stage, a factorial experiment was conducted in a completely randomized design with three replications in greenhouse conditions. The results showed that the traits of nitrogen, phosphorus, potassium, iron, zinc, copper and manganese of the root as well as total chlorophyll and glycine-betaine were affected by the interaction of salinity stress and methyl jasmonate foliar application. Mean comparison showed that the highest amount of elements in the roots of rice plants was related to salinity stress treatment and methyl jasmonate foliar application. In contrast, the lowest amount of elements in the roots of rice plants was related to salinity stress treatment of 10 dS/m and no use of methyl jasmonate. With increasing salinity stress, the amount of glycine-betaine was increased and the highest amount was in the treatment of methyl jasmonate foliar application and salinity stress of 10 dS/m at 1.36 µmol. Total chlorophyll content was also highest in methyl jasmonate foliar application and no salinity stress at 12.21 µmol/g fresh weight. The results of principal component analysis showed that the first and second components accounted for 99% of the total variance. Based on the biplot results, it was observed that methyl jasmonate foliar application + salinity stress of 10 dS/m was highly correlated with glycine-betaine.
Keywords: Chlorophyll, salinity stress, iron, glycine betaine

PP47 Response of photosynthetic properties of corn plant to foliar application of silicon and calcium in vegetative stage

Farhad Habibzadeh[1*], Seyyed Jaber Hosseini[2] -*1. Departmet of Genetics and Plant Breeding, Faculty of Agriculture and Natural Resources, Imam Khomeini International University, Qazvin, Iran; 2. Department of Agronomy, Faculty of Agriculture, Tarbiat Modares University, Tehran, Iran. E-mail: habibzadeh_f@eng.ikiu.ac.ir*

Photosynthesis is one of the most important plant processes that plays an important role in the production of plant sugars. Silicon and calcium are important and physiologically active elements that have an important effect on the structure of cell membranes and cell walls of plants and the regulation of various plant activities, including biochemical, metabolic and growth processes. Therefore, in order to investigate the effect of foliar application of silicon and calcium on the photosynthetic properties of corn in the vegetative stage, a factorial experiment was conducted in a completely randomized design with three replications in greenhouse conditions. The results showed that the traits of chlorophyll a, chlorophyll b, total chlorophyll, chlorophyll a to b ratio, carotenoids and anthocyanins were affected by the interaction of silicon and calcium foliar application and were significant at the level of one percent. The results of mean comparison showed that the highest amount of total chlorophyll was related to the application of 5% silicon and 5% calcium at the rate of 12.03 µg/ml; In contrast, the lowest amount of total chlorophyll was observed in the treatment of non-application of silicon and calcium at the rate of 6.19 µg/ml. Also, the highest amount of chlorophyll a and b in the treatment of 5% silicon and 5% calcium was 8.22 and 3.81 µg / ml, respectively. The ratio of chlorophyll a to b, anthocyanins and carotenoids was also affected by calcium and silicon application treatment and the amount of these traits decreased with increasing calcium and silicon consumption. Regression relationships also showed that there was a strong relationship between chlorophyll a and total chlorophyll (R^2 = 0.92). Also, the highest amount of chlorophyll a and b in the treatment of 5% silicon and 5% calcium was 8.22 and 3.81 µg/ml, respectively. The ratio of chlorophyll a to b, anthocyanins and carotenoids was also affected by calcium and silicon application treatment and the amount of these traits decreased with increasing calcium and silicon consumption. Regression relationships also showed that there was a strong relationship between chlorophyll a and total chlorophyll (R2 = 0.92).
Keywords: Anthocyanin, Chlorophyll**,** Corn, Silicon

PP48 Comparison the effect of phenanthrene and Pyrene, on seed germination and growth parameters of seedlings in sunflower plant

Maryam Nemati*[1], Seyed Yahya SalehiLisar[1], Ali Movafeghi[1], Rouhollah Motafakkerazad[1] -*1. Department of Plant Sciences, Faculty of Natural Sciences, University of Tabriz, Tabriz, Iran. E-mail: maryam.n136262@gmail.com*

Polycyclic Aromatic Hydrocarbons (PAHs), usually as byproducts of carbon-based fuel combustions, are an important group of pollutants with wide distribution in the environment. PAHs are toxic for almost all organisms, and plants can uptake such compounds via roots and translocate to various aerial parts. Given

that germination is the first and most important stage of plant growth, the main objective of this research is to evaluate the effects of phenanthrene and pyrene, as well-known PAHs, on germination, root growth, dry and wet weight of seedlings, as well as biochemical activities in sunflower (*Helianthus annuus* L). For this purpose, the seeds were hydroponically cultivated in a perlite substrate treated with various concentrations of phenanthrene and pyrene (0, 50 and 100 ppm) and then intended investigations were done. The results showed that both contaminants had inhibitory effects on germinations and growth parameters, however pyrene had a greater effect than that of phenanthrene. Hydrogen peroxide contents were increased by phenanthrene and pyrene treatments. Also soluble sugar content was significantly reduced in the roots, while it was increased in the shoots of plants treating by 50 ppm of pyrene compared to the control. Overall, the negative effect on growth as well as some biochemical parameters of the sunflower plant is probably due to the oxidative stress generated by these compounds which was shown with increased hydrogen peroxide. This eventually reduced germination and growth parameters of the sunflower plant.In order to expand this work, the structural and ultrastructural changes in the cells and tissues of sunflower plant under the influence of phenanthrene and pyrene can be studied.

Keywords: Polycyclic Aromatic Hydrocarbons (PAHs), Hydrogen peroxide, Oxidative stress, sugar content

PP49 Study of β-1,3- glucanase enzyme in cucumber plant in response to *Pseudoperonospora cubensis*

Hanieh Abedinpour[1,2], Nadali Babaeain Jeloudar[1], Ali Dehestani[2*], Ghorbanali Nematzadeh[1,2] *-1. Sari Agriculture Science and Natural Resource University (SANRU), Sari, Iran, 2. Genetics and Agricultural Biotechnology Institute of Tabarestan (GABIT), Sari, Iran. E-mail: a.dehestani@gmail*

Cucumber is an important crop of economic importance and its performance is affected by biotic and abiotic stresses. Cucumber Downey mildew, caused by *Pseudoperonospora cubensis*, is an important disease that can remarkably reduce its production. Pathogenesis-related proteins (PRs) are a major factor during the period of plant-pathogen interaction, and any group of PR proteins may be part of the first line of defense against the pathogen. β-1,3- glucanase is a pathogenesis-related protein that degrades β-1,3- -glucan, a main structural component of the fungal cell wall, and prevents pathogen growth. For this purpose, β-1,3-glucanase enzyme has been measured in cucumber plants treated with 1 mM salicylic acid (SA) and 1 mM azelaic acid (Aza) at 6, 12, 24 and 72 hours after inoculation with Downy mildew. Results indicated that β-1,3- glucanase content was decreased in SA and Aza-treated plants compared with control .However, the highest amount of enzyme was observed at 12 h post-inoculation with the pathogen. The enzyme content was increased in SA-treated plants at 6h post-inoculation with pathogen and there was no significant difference with the untreated control at 24 and 72 h post-inoculation. Enzyme content was recorded higher in plants treated with Aza at 6 and 24 hours post inoculation with the pathogen than in the control. These results suggest that an increase in the glucanase activity as one of the pathogenesis-related proteins may have significantly contributed to the resistance of cucumber plants against downy mildew.

Keywords: Pathogen, Salicylic acid, Azelaic acid, Pathogenesis-related (PR) proteins

PP50 Study of the effect of azelaic acid on phenyl alanine ammonia lyase enzyme activity in response to cucumber downy mildew

Hanieh Abedinpour[1,2], Nadali Babaeain Jeloudar[1], Ali Dehestani[2*], Ghorbanali Nematzadeh[1,2] *-1. Sari Agriculture Science and Natural Resource University (SANRU), Sari, Iran, 2. Genetics and Agricultural Biotechnology Institute of Tabarestan (GABIT), Sari, Iran. E-mail: a.dehestani@gmail.com*

Downy mildew caused by *Pseudoperonospora cubensis* is one of the most damaging diseases of cucurbits, including cucumber. Treatment of plant products with inducers to complement or replace the effect of chemical fungicides for disease control is of particular interest. Azelaic acid is a natural compound that induces plant defense responses through a priming mechanism. The objective of this study was to investigate the effect of azelaic acid on Phenylalanine ammonia lyase enzyme activity in cucumber tissues before and after inoculation with downy mildew causal agent. In this study, cucumber plantlets were inoculated with pathogen two days after treated with azelaic acid. PAL enzyme was measured at 6, 12, 24, and 72 hours post-inoculation using a spectrophotometer. The results showed that PAL enzyme activity

increased in Aza-treated plants at 6 and 72 hours compared to the control. Also, the enzyme content increased at 12 hours post-inoculation with the pathogen and then gradually decreased to the lowest amount in 72 hours. In Aza-treated plants, the enzyme content increased significantly after inoculation with the pathogen, indicating that Aza treatment can play a positive role in disease resistance. The findings of this study show that Azelaic acid can be used as a natural, simple, and inexpensive compound in plant disease control programs.

Keywords: pathogen, inducer, resistance, cucumber

PP51 Changes in Phenol compounds content due to Changes in Light Intensity in *Thymus vulgaris L.*

Zahra Hashemifar[1], Forough Sanjarian[*1] , Hassan Ali Naqdi Badi[2], Ali Mehrafarin[2] *-1. Plant Bioproducts Group, Plant Research Institute, National Institute of Genetic Engineering and Biotechnology, 2. University Jihad Medicinal Plants Research Institute, University Jihad Research Center. E-mail: forough.sanjarian@gmail.com*

Thymus vulgaris L. belongs to the Lamiaceae family. The chemical composition of *T.vulgaris* includes phenols and terpenoids, especially thymol, eugenol and saponins (1). Phenols and phenolic compounds such as flavonoids act as antioxidants and eliminate the cytotoxic effects of oxygen free radicals in the plants. The large amount of phenols and flavonoids in the plant extract can explain that high antioxidant activity in the plant (2).In this Study, *the* plant cuttings were grown in greenhouse conditions for 6 months. Then they were taken out of the greenhouse and treated with different light intensities in a randomized complete block design (CRD) with three replications. To apply different light intensities, green shades with different shading percentages were used. The percentage of natural light that the plant provides is as follows: 20%, 50%, 70% and 100%. After two months of treatment, the phenolic content of the samples was determined using Folin-Ciocalteu reagent method and Gallic acid as the standard (2). Data analysis was performed with SAS 9.0 software and finally the graphs were drawn in Excel 2016 software. The results of statistical analysis showed that there is a significant difference between all four light levels in terms of the amount of phenol production. The amount of phenol production in 20, 50, 70 and 100% light treatments is 2.06, 1.69, 1.92 and 2.33 (ng / ml), respectively. These changes do not follow a linear pattern. In fact, with decreasing light intensity, the production of phenol first decreases and then increases. On the results, it can be said that more free radicals are produced against light, and as a result the need for phenols, which are plant antioxidants, increases.

Keywords: *Thymus vulgaris,* Antioxidants, light filters

PP52 Medicinal Plants of East of Golestan (Turkmens) on Gastrointestinal illness

Razieh Saadaty[1*], Ali Sattarian, Abolfazl Daneshvar, Elham Amini *-1. Biology Department, Faculty of Science, Gonbade kavus University, Golestan, Iran. E-mail: razieh.saadaty@gmail.com*

Medicinal plants are a group of plants that, their organs have compounds with medicinal properties, and because of the therapeutic effects for humans or animals, used in the pharmaceutical industry. These plants are among the natural resources of each country. Medication and treatment is an important element of ethnobotany that encompasses native therapeutic traditions, beliefs, and practices. Ethnobotany identifies medicinal plants by referring to the natural realms and by applying the medicinal experiences of different cultures and ethnicities. In this regard, Golestan province, due to its different ethnic and cultural composition, it has a good background for reviewing medicinal plants information. In this research, by visiting experiences of Turkmen people who lives in east of Golestan were about 30 villages in the Turkmen province east of the province and interviewing local skilled people, including women and men, medicinal plants of the region, method of use, time of use and their application are recorded, 25 out of 61 species were list for treatment of gastrointestinal illness, including: ulcer peptic, flatulence, stomach ache, constipation. Example of them including; *Urtica dioica* L.(Urticaceae) ،*Mentha longifolia* (Hud) (Labiatal) ،*Peganum harmala* L.(Zygophyllaceae) ،*Tragopogon persicus* Biss (Asteraceae), *Glycyrrhiza glabra* L. (Fabaceae) ، *Teucrium polium* L. (Lamiaceae). The method of processing all medicinal plants was also recorded in this study, most of them are boiled plants.

Keywords: Ethnobotany- Ulcer peptic- Constipation- *Peganum harmala* L

PP53 Investigation of the thermal stability of plant *Lepidium draba* L. peroxidase at different temperatures

Seyedeh Maryam Hosseini[1] , Ali Riahi-Madvar[2]*, Mojtaba Mortazavi[1], Safa Lotfi[1] -*1. Department of Biotechnology, Institute of Science and High technology and Environmental Sciences, Graduate University of Advanced Technology, Kerman, Iran; 2. Department of Molecular and Cell Biology, Faculty of Basic Sciences, Kosar University of Bojnord, Bojnord, Iran. E-mail: riahi.ali@gmail.com*

Peroxidases are enzymes found in various organisms such as animals, plants and microorganisms. These enzymes are oxidoreductases that can use various compounds as hydrogen donors in the presence of hydrogen peroxide and are widely used in the decomposition of pollutants, wastewater treatment and in biosensors. The main purpose of this study was to investigate the thermal stability of plant Lepidium draba L. peroxidase (EC 1.11.1.7) at different temperatures. In this study, after the expression of the recombinant enzyme in liquid LB medium in the presence of IPTG, its purification was performed using 5- nickel-sepharose affinity chromatography column and a separating buffer containing imidazole. The Protein purity was determined using SDS-PAGE and its concentration was measured using Bradford method. In order to evaluate the thermal stability, the enzyme with the concentration of 0.5 mg/ml was incubated in the temperature range of 30 to 80 °C for 10 minutes and then it was kept at room temperature for 5 minutes. Thereafter, the activity of enzyme was measured using H_2O_2 and TMB as the enzyme substrates in potassium phosphate buffer (pH=7) at 653 nm using a spectrophotometer (carry60). The results showed that the activity of the enzyme was higher in the temperature range of 30 to 40 °C and its activity decreased with increasing temperature. So that at the highest temperature (80 °C) the enzyme maintained about 53% of the initial activity. The application of mutagenesis methods is suggested to increase the thermal stability for using of this enzyme in higher temperatures.

Keywords: Activity, H_2O_2, Purification

PP54 Morphological traits variety in different populations of *Hordeum spontaneum*

Hamideh Javadi[1*], Parvin Salehi Shanjani[1] -*1. Research Institute of Forests and Rangelands, Tehran, Iran. E-mail: Hjavadim@yahoo.com*

Hordeum spontaneum C.Koch is wild barley that is distributed in Iran, Iraq, Afghanistan, Palestine, Jordan, and Mediterranean regions (Mozaffarian, 2006). The aim of this survey is the comparison of different populations of *H. spontaneum* for morphological traits and select of better one based on these traits. Morphological studies are the basis for identification, taxonomic, and selection in improvement programs and it is so important after years (Rejesus et al., 1996). In this study, we used the seeds of populations from different regions of Iran. They are cultured in pods and they were transferred to the farm. The morphological traits were measured after flowering and end of the growth period. The traits including plant height, internode length, number of the tiller, inflorescent length, length and width of leaf, wet and dry weight. The data were analyzed by SAS software. The analyses of variance and comparison of means showed that the most value of plant height, internode length, inflorescent length and the most of wet and dry weight, number of tillers were shown in population 32849(Kermanshah, west Eslam-Abad) and populations 4518(Lorestan, Khorram-Abad) and 6518(Lorestan, Poldokhtar), respectively. So due to the important of forage production in the grass, two populations, 4518 and 6518 are the best, compared to other populations.

Keywords: Wild Barley, Forage yield, Grass

PP55 Floristic study of Afous area

Fatemeh Shirvani[1], Shabnam Abbasi[1*], Saeed Afsharzadeh[1] -*1. Department of Plant and Animal Biology, Faculty of Biological Science and Technology, University of Isfahan. E-mail: abbasishabnam@yahoo.com*

Pastoral region of Cheshmehsaran Afous with 1146 hectares area is located at 45 Km to Bouin Miandasht region (Isfahan province) between 33° ′ 05′′ to 33° 58′ ′ latitudes and 50° 02′ to 50° 09′ longitudes. The maximum heights above sea level were 2400 m. The average annual precipitation is 466/2 mm and the average temperature is 10 °C. The purpose of this research was investigation of flora of the region. So the plant species were collected from different sites during eight times in spring, summer and atumn 2017. Identification of flora was done with

different Flora & Monographs. In this study a complete list of flora life forms and chorotypes of plant elements was prepared. Identified vascular plants in the region were mostly flowering with 192 species belonging to 36 families and 139 genera. Asteraceae (34 species), Fabaceae (17 species), Lamiaceae (14 species), Apiaceae and Poaceae (each of them, 13 species), Brassicaceae and Liliaceae (each of them, 12 species) were the largest families in this region,respectively. The largest genera were *Astragalus* (with 14 species), *Euphorbia* (with 5 species), *Silene* , *Centaurea*, Stachys (with 4 species), *Cousinia and Scorzonera* (with 3 species) and *Fritillaria* (2 species), respectively. The most important geographic elements were related to Irano-Turanian floristic region with 142 species (78/4%). Hemicryptophytes (112 species, 58/33%), Cryptophyte (30 species, 15/62 %), Theophytes (25 species, 13/02%), Chamaephytes (18 species, 9/37%) and Phanerophytes (7 species, 3/64%) and were the most important life forms, respectively. The dominant vegetation type of the region includes main species of *Astragalus.* Species of *Eremorus persicus* with diffuse shrubs of *Prunus houssknechti* were seen at higher altitude.

Keywords: Vegetation, flora, Bouin Miandasht, Irano Turanian region, Hemicryptophytes

PP56 Chemotaxonomy study and flavonoid diversity of *Teucrium polium, T. capitatum, T. gnaphalodes* and *T. orientale* (Lamiaceae) 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*

The genus *Teucrium* L. belonging to Lamiaceae family and Ajugoideae sub-family is represented by 260 species throughout the world, and 19 species in Iran. The taxonomic complexities of this genus are mostly due to morphological variability and natural hybridization. Consequently, this study aims to assess the taxonomic status of *Teucrium* species using flavonoid data, determine the flavonoid classes and their diversity. Four species, three subspecies and 53 accessions of two sections *Teucris* and *polium* were collected from the west, center, southwest and south of Zagros region. Extraction and identification of leaf flavonoids were performed by 90% MeOH, rotary evaporator, thin layer chromatography and Liquid Chromatography-Mass Spectrometry (LC-MS/MS). The chemotaxonomic status of *Teucrium* species and variations of flavonoid patterns at inter and intra-specific levels were investigated using the presence and absence of flavonoid spots, cluster analysis based on UPGMA method, Dice similarity coefficient, and Cluster Vis v.1.8.2. According to the results of cluster analysis, considerable flavonoid variations were recognized in the accessions of *T. orientale* subsp. *glabrescens* (Hausskn. ex Bornm.) Rech. f. (six groups), *T. polium* L. (five groups) and *T. orientale* subsp. *taylori* (Boiss.) Rech. f. (five groups). The subspecies of *T. orientale* L. were clearly grouped but some similarities were observed between the subspecies of *taylori* and *glabrescens.* Despite considerable morphological similarities among *T. polium*, *T. capitatum* L., and *T. gnaphalodes* L'Her., three species were separated. The highest abundance of flavonoid class was attributed to flavones (18), isoflavones (17) and flavonols (13). Moreover, the subspecies of *T. orientale* were discriminated using flavones and flavonols. In conclusion, flavonoids are introduced as appropriate markers in the taxonomy of the genus *Teucrium*.

Keywords: Flavone, marker, diversity, chromatography

PP57 Identification of flavonoid constituents in *Teucrium melissoides, T. parviflorum, T. oliverianum* and *T. scordium* (Lamiaceae) from Zagros region, Iran

Seyed Hossein Bagheri Moghadam [1], Navaz Kharazian [1*] *-1. Department of Botany, Faculty of Sciences, Shahrekord University, Shahrekord, Iran. E-mail: nkharazian@gmail.com*

The genus *Teucrium* L. belonging to Lamiaceae family and Ajugoideae sub-family with numerous medicinal properties, has been considered in pharmaceutical science and traditional medicine. The aim of this research is to determine the flavonoid compounds and detect chemical markers in four *Teucrium* species belonging to the center, west, south and southwest of Zagros regions. The flavonoid of dried leaves (10 gr) was isolated using pure MeOH and rotary evaporator at 70°C. In order to purify flavonoids and prepare several fractions, column chromatography (sephadex LH_{20}) with 100 mL $CHCl_3$-MeOH 60:40 was applied. In addition, the identification process of flavonoid compounds was achieved using High Performance Liquid Chromatography Mass Spectrometry technique. The mass spectrometry (MS) was arranged in the

range of m/z 267-785 using negative ionization mode and full scanning. In total, five fractions were investigated in MS/MS process. The results of this research showed 93 flavonoid compounds. The highest number of flavonoid compounds belonged to *T. scordium* L. (40 compounds). Some tannins and hydroxycinnamic acid derivatives were also recognized in low quantities. The most important flavonoid compounds in four species included dihydrorotenone (isoflavone), daidzein (iosoflavone), isorhamnetin (flavonol), diosmin (flavone), myricetin (flavone), artocarpin (flavone), isosakuranetin (flavanone), and methoxychalcone (chalcone) derivatives. In total, eight chemical markers were identified for each species including tectochrysin-glucoside, biochanin-malonylglucoside (*T. melissoides* Boiss. ex Hausskn. ex Boiss.), kumatakenin, dihydroxy-trimethoxychalcone (*T. olivieranum* Ging. ex Benth.), aspalathin, robinetin trimethyl ether (*T. parviflorum* Schreb.), chrysoeriol-diglucoside, and irigenin (*T. scordium*). Finally, High Performance Liquid Chromatography Mass Spectrometry is a powerful technique to exhibit different flavonoid compounds and chemical markers for *Teucrium* species. The evidence of this research is useful for chemotaxonomic, pharmaceutical and therapeutic purposes.

Keywords: Liquid chromatography, spectrometry, phytochemistry

PP59 Identification of heavy metal accumulator plants(Zn^{2+} and Mn^{2+} accumulator) in Sarcheshmeh copper mine in Kerman

Fereshteh Mohamadhasani Javar- *Biology Department, Payame Noor University, Bam, Iran. E-mail: Fereshtehmhasani@yahoo.com*

Sarcheshmeh Copper mine is located in south-west of Kerman.It is one of the important mineral and industrial site of Iran.In addition, mining actirities have brought more heavy metals from belowground into the surface and caused more pollution in the area. Heavy metals are one of the most important environmental pollutants. The aim of present study was to identify accumulator plants that are effective for phytoremediation. Plant species and soil samples were collected from this region for determination of heavy metals content. Atomic Absorption Spectrophotometer (AAS) was used for analysis of heavy metals in soil and plant samples. The results of this research showed that there are some hyper accumulator plants in this area (such as: *Poaceae, Asteraceae, Polygonaceae)* that can concentrate heavy metals in their different parts. Thus they can be used for remediation of polluted area.

Keywords: Hyper accumulator plants, Phytoremediation, Heavy metals, copper mine

PP61 Investigation of the ability of *Ferula assa-foetida* plant to stabilize the lead metal plant

Kobra Mahdavian [1*] *-1. Assistant Professor, Department of Biology, Faculty of Science, Payame Noor University, Tehran, Iran.* *E-mail: k.mahdavian@pnu.ac.ir*

Mining activities are major contributors to soil contamination, and in general, surface soils around mines contain high levels of these metals. The aim of this study was to evaluate the ability of lead absorbed is by *Ferula assa-foetida* from soil contaminated with lead .After identification of plant samples collected, the samples were prepared for analysis. The amount of Pb, electrical conductivity, pH was measured and the ability of plant samples for lead uptake and accumulation by calculating the biological concentration factor (BCF) and translocation factor (TF) were studied. It is also observed that the amount of exchangeable lead elements in soil ranges from 32 to 63 mg / kg dry weight. The average pH of soil samples was determined from 7.5 to 8.8. Also, the results showed that the highest average amount of lead in grasshopper was 407 mg / kg in roots, 43 mg / kg in air and 42 mg / kg in soil. Bioavailability factor (BCF) plants are more than one and less than one transfer factor (TF) is suitable for plant fixation. Studies have shown that bioavailability factor in *Ferula assa-foetida* 1.4 and transfer factor is 0.2. Therefore, *Ferula assa-foetida* plant is the most suitable species for phytoremediation of lead contaminated soils.

Keywords: Bioavailability factor, Phytoremediation, Transfer factor

PP62 The role of *Ferula assa-foetida* plant in zinc phytoremediation

Kobra Mahdavian [1*] -*1. Assistant Professor, Department of Biology, Faculty of Science, Payame Noor University, Tehran, Iran. E-mail: k.mahdavian@pnu.ac.ir*

Phytoremediation is the use of green plants to clean heavy metal contaminated areas. The aim of this study was to investigate the zinc phytoremediation by *Ferula assa-foetida* plant .After identification of plant samples collected, the samples were prepared for analysis. The amount of Zn, electrical conductivity, pH was measured and the ability of plant samples for zinc uptake and accumulation by calculating the biological concentration factor (BCF) and translocation factor (TF) were studied. It is also observed that the amount of exchangeable zinc elements in soil ranges from 132 to 144 mg / kg dry weight. The average pH of soil samples was determined from 7.8 to 8.9. Also, the results showed that the highest average amount of zinc in grasshopper was 148 mg / kg in roots, 73 mg / kg in air and 124 mg / kg in soil. Bioavailability factor (BCF) plants are more than one and less than one transfer factor (TF) is suitable for plant fixation. Studies have shown that bioavailability factor in *Ferula assa-foetida* 1.2 and transfer factor is 0.5. Therefore, *Ferula assa-foetida* plant is the most suitable species for phytoremediation of zinc contaminated soils.

Keywords: Bioavailability factor, Phytoremediation, Transfer factor

PP63 Study on seed coat of some *Colchicum* L. (Colchicaceae) species from Guilan Province

Fatemeh Bazdid Vahdati[1*], Marzieh Beygom Faghir[1], Mostafa Assadi[2]-*1. Department of Biology, Faculty of Science, University of Guilan, Rasht, Iran,* 2*. Research Institute of Forests and Rangelands, Tehran, Iran. E-mail: Fatameh_vahdati@yahoo.com*

Genus Colchicum L. belongs to Colchicaceae family including about 100 species in the world. This genus is represented by 15 species in Iran of which 9 occur in northern Iran. The aim of this investigation is to estimate the taxonomic value of seed coat quantitative and qualitative characters in delimitation of *Colchicum* species. In the current survey, seed coat micro- morphological characters of 4 species of *Colchicum (C.trigynum, C. szovitsii, C.freynii* and *C.speciosum)* from Guilan Province (N Iran) are investigated for the first time using scanning slectron microscope. Seeds coat micro- morphology revealed three types of sculpturing (including reticulate, reticulate-areolate and rugose) and fruits morphological analysis showed the importance of beak length in this genus. This study clarified that seed macro and micromorphological characters are significant features in taxonomic classification of the genus *Colchicum*. Unweighted Pair Group Method with arithmetic mean (UPGMA) and Principle Component Analysis (PCA), strongly supported the delimitation of the taxa. Based on seed coat characters a key is presented.

Keywords: Micro- morphology, Taxonomy, Surface sculpture, Scanning electron microscope, Iran

PP64 Taxonomic study of *Colchicum sobliferum* (Fisch.& C.A.Mey) Stef. (Colchicaceae) in Iran with emphasis on Floristic marker and using special station method

Fatemeh Bazdid Vahdati[1]*, Marzieh Beygom Faghir[1], Mostafa Assadi[2] -*1. Department of Biology, Faculty of Science, University of Guilan, Rasht, Iran, 2. Research Institute of Forests and Rangelands, Tehran, Iran. E-mail: Fatameh_vahdati@yahoo.com*

Genus *Colchicum* L. belongs to Colchicaceae family including 100 species in the world, of which fifteen taxa are distributed in Iran. *Colchicum sobliferum* (Fisch.& C.A.Mey) Stef. is one of the species of this genus which grows in wet grasslands in the Iran, Afghanistan and Pakistan. To determine intraspecific variations in *Colchicum sobliferum* from taxonomic point of view and effective ecological factors, data are collected using special station method. In this way, eight special stations are recognized for *C. sobliferum* in Iran. Results from floristic data analysis with R software by PCA method, led to the identification of 3 separate groups that is indicative of the existence of intraspecific diversity. Morphometric data analysis of individual collected from each special station, by using 40 quantitative and qualitative morphological characters, is made with R software by PCA and UPGMA methods, confirmed 3 mentioned floristic groups. The ecologic data are analyzed with CCA method. Analysis of ecologic data showed that ecological factors

are effective in grouping and forming special stations diversity, so that among studied factors, altitude, soil texture and slop direction factors are all effective in groupment of special stations.
Keywords: Environmental factors, Intraspecific diversity, Morphological characters, R software

PP66 Effect of Iron Oxide Nanoparticles on Nutrient Uptake of Tomato under Cadmium Stress

Razieh Rahmatizadeh[*1], Mohammad Javad Arvin[2], Ahad ebne abdolalli[3] -*1. Biology Department, Faculty of Science, Urmia University, Urmia, Iran; 2. Horticulture Department, Faculty of Agriculture, Kerman, Iran; 3. Horticulture Department, Faculty of Agriculture, Urmia University, Urmia, Iran. E-mail: Razieh_rahmaty@yahoo.com*

Today, nanotechnology has affected all fields of science, especially plant science, and has gained a special status in improving the quality of human life. The role of iron in reducing non-biological stresses has not been widely evaluated despite the fact that it is considered an essential element for plant growth. In this study, the effect of foliar application of iron oxide magnetic nanoparticles (Fe_3O_4) in five concentrations (0, 10, 20, 50 and 100 mg/L) on tomato plant subject to three concentrations of $CdCl_2$ (0, 100 and 200 μM) was assessed. The results showed that cadmium had a negative impact on plant growth and nutrients uptake, so that increasing cadmium concentration led to further reduction in growth parameters; however, 20 mg/L concentration of Fe_3O_4 improved this condition by augmenting nutrient absorption and reducing cadmium uptake. In general, accumulation of nutrients, which is associated with an increase in biomass and subsequent dilution of heavy metal in plant structure, leads to a reduction in the toxicity of heavy metals.
Keywords: Nutrition, Environmental stresses, nanotechnology, heavy metal

PP67 Histological changes in *Panicum miliaceum* in response to phenanthrene contamination

Sarieh Tarigholizadeh[1*], Rouhollah Motafakkerazad[1], Elham Mohajel Kazemi[1], Seyed Yahya Salehi Lisar[1] -*1. Department of Plant Sciences, Faculty of Natural Sciences, University of Tabriz, Tabriz, Iran. E-mail: saryeh_tarigholizadeh@tabrizu.ac.ir*

Histological studies based on anatomical and histochemical changes can significantly contribute to our better understanding of cellular processes as well as how plants respond to biotic and abiotic stresses at different cell and tissue levels. *Panicum miliaceum* is a well-known crop in *Poaceae* family, however, there have not been many histological studies of the effects of abiotic stresses on this plant. Therefore, the aim of this study was to evaluate the anatomical changes in different parts of the plant (root, leaf and stem) under phenanthrene (PHE) contamination. Phenanthrene is an organic pollutant belonging to the group of polycyclic aromatic compounds (PAHs) which can penetrate into plants through different pathways, especially via roots, transport to different parts of the plant, and ultimately influence the morphological, anatomical, and physiological properties of plants. The seeds were hydroponically cultured within control and PHE-treated groups (500 and 1000 ppm), after 45 days, the samples were harvested and fixed in FAA solution. After sectioning and staining with Fast green and Safranin, they were studied with an optical microscope for changes in the anatomical structure. Examination of the anatomical traits showed that all plant tissues were undergone changes associated with PHE stress. The most important changes in roots include an increase in the number and size of cortex parenchymal cells, thickened xylem cells, and a general increase in the thickness and diameter of roots compared to the control. In leaves, the process of lignification was completely evident in samples treated with PHE. In stem of the treated plants, the number of vascular bundles as well as the amount of lignification increased and, thus they had more stability and resistance than the control samples. It can be concluded that the increased lignification probably obtained to increase the resistance of the plant as a defense mechanism against PHE stress.
Keywords: Polycyclic Aromatic Hydrocarbons, Stress, Anatomical structure, Crop plant, Microscopy

PP68 Investigation of Genetic Diversity of *Quercus brantii* Lindl. Populations Using ISJ Semi-random Markers

Sorour Mahmoudvand [1*], Hamed Khodayari [2], Farajollah Tarnian[3] -*1. Department of Biology, Faculty of Basic Sciences, Lorestan Univercity, Khorramabad, Iran; 2. Department of Biology, Faculty of Basic Sciences, Lorestan Univercity, Khorramabad, Iran; 3. Department of Range and Watershed Management, Faculty of Agriculture and Natural Resources, Lorestan Univercity, Khorramabad, Iran. E-mail: sr.mahmoudvand@gmail.com*

The evaluation genetic variations in trees has important results for the conservation of genetic resources, and the use of molecular markers is the best way to identify genetic diversity. In this study, for the first time, genetic diversity within and between populations of 10 populations from Persian oak species (*Quercus brantii* Lindl.) was investigated using ISJ (Interon-exon Splice Junction) molecular markers in Lorestan province. In this study, 50 samples from different bases of Persian oak species and 10 ISJ primers including IT and ET primers with different nucleotide numbers were used (Panjoo *et al.*, 2014). The molecular variance (AMOVA) showed that genetic diversity within populations was 76% higher than between population diversity at 24% using GenALEx 6.5. The values of genetic differentiation coefficient (F_{ST}) and gene flow (N_m) were 0.114 and 1.938, respectively. Also, the initiators created 1911 bands, that about 1893 were polymorphic bands. The highest number of polymorphic bands was related to IT 10-3 primer pairs, IT 10-6 with 523 bands and the lowest number of polymorphic bands was related to IT 10-1, IT 10-3 primer pairs with 428 bands. Also, the highest and lowest amount of polymorphic information (PIC) is related to the pairs of primers ET 15-34, ET 15-35 about 0.95 and ET 15-33, ET 15-34 about 0.90, respectively. The dendrograms of Persian oak populations were plotted using the Jaccard similarity coefficient based on the UPGMA method in NTSYSpc 2.10e. Individuals of Persian oak species were clustered in two main groups, that sample number four of Kakareza population in a group and other samples from other populations in another group. In general, it can be concluded that the use of polymerase chain reaction using semi-random ISJ markers to separate different sampels from different populations of Persian oak species is appropriate.

Keywords: Primer, Persian Oak, Molecular Markers, Interon-exon Splice Junction

PP69 Comparison of Cultivation of Plant Tissues of Healthy and gall branches in the *Salix babylonica*

Shahla Kazemi renani [1*], Behrouz Salehi[2], Habibollah Nazem[2]-*1. Department of Biochemistry, Payame Noor University, Isfahan, Iran, 2. Department of Bilogy, Payame Noor University, Iran. E-mail: Kazemishahla23@gmail.com*

The lateral and apical buds of the weeping willow tree change their growth against the attack of the eriophid mide, creating a broom-like gall that the parasitic insect uses to feed or as a shelter. In order to understand the changes in the gall, healthy branches of the weeping willow tree were removed by removing the plant tissue mite. Detergents are separated from the branches and after disinfection with 20% sodium hypochlorite and 70% ethanol, washed with distilled water and transferred to MS culture medium under Laminar hood and in optical conditions, 8 hours of darkness and 16 hours of light were maintained at 25° C for one month. Cultivation results showed that the cultured tissue from the gall branches grew in the same way as the plant, indicating that the gall agent, by induction between specific genes, altered the process of expression of specific genes, which even With its physical elimination, its internal changes have been institutionalized. The node from the gall branches grew in the same way in the culture medium and were accompanied by deformation of the leaves and reduction of the distance between the node and the size of the leaves, and these branches, unlike the branches from the nodes, Healthy, they had no roots. Therefore, the changes caused by the gall insect are internal, and its physical removal does not change the process of gall formation. On the other hand, due to the lack of root formation in the culture medium, it is shown that the amount of auxin hormone, which is the root cause factor in these gall branches, has decreased.

Keywords: Eriophyte mite, MS culture medium, Rooting, Tissue culture, Willow

PP70 Comparison tolerance of two-cultivars greenhouse cucumber germination to salinity stress

Amir Hossein Forghani[1]*, Peyman Aghaei[1]- 1. *Department of Biology, Payame Noor University, Iran. E-mail: amirforghani@gmail.com*

Salinity has a critical role in the reduction growth and yield of crops, especially in arid and semiarid regions. Many processes of plant growth such as germination affect by salinity. In order to study the effects of salinitystress on parameters of cucumber germination, a completely randomized experiment with salt (0, 50, and 100 mM NaCl) and cultivar factors (Keyhan, Storm) was designed with six replications. After placing 15 seeds in each Petri dish and treating with saline water, they were incubated in the germinator for 10 days with 25±2 ℃ temperature and humidity of 30%. The result of analysis indicated a significant effect of genotype on all character measured under salt stress. The percentage and rate of germination, fresh and dry weight of roots and shoots, and the length of roots and shoots significantly reduced in two cultivars under salt stress. The most negative influence of salt was detected in 100 mM NaCl. In response to salt, the germination percentage of Storm cultivar reduced about 6% with compare to Keyhan cultivar. Moreover, the length of shoots and roots in Storm cultivar decreased about 50 and 25% compared with Keyhan cultivar under NaCl stress. The analysis of data showed an increase in catalase activity, proline content, and lipid peroxidation of two cultivars under salt stress. Furthermore, the activity of catalase and proline was higher in Keyhan cultivar under salt stress. However, lipid peroxidation in Keyhan cultivar was less than Keyhan. Therefore, It seems that Keyhan cultivar tolerate to salinity stress.

Keywords: *Keyhan, Storm, Catalase, proline, NaCl*

PP72 The effect of arbuscular mycorrhizal fungus on photosynthetic pigments and growth parameters of *Valeriana Officinalis* L. under water-deficit stress

Somayeh Naghdi [1*], Zohreh Toghranegar[2], Elaheh Vatankhah [2], Mahnaz Vafadar [2], Setareh Amanifar [3] -*1*. *M. Sc. Student, Biology Department, Faculty of Sciences, University of Zanjan, Iran, 2. Assistant Prof., Biology Department, Faculty of Sciences, University of Zanjan, Iran,3. Assistant Prof., Soil Science Department, Faculty of Agriculture, University of Zanjan, Iran. E-mail: so.naghdi@gmail.com*

Water deficit is one of the most common abiotic stresses worldwide, including Iran that limits plant growth and production by disrupting photosynthetic processes. One of the biological solutions for improving tolerance of plants under stress is the application of biofertilizers containing beneficial soil microorganisms, such as arbuscular mycorrhizal fungi (AMF). This research aimed to evaluate the effect of inoculation with *Funneliformis mosseae* on valerian growth parameters and chlorophyll content under drought stress conditions during 2019 and 2020 in a factorial completely randomized design with four replications. Mycorrhizal and non-mycorrhizal plants were subjected to three different moisture levels (available water (AW): 100% AW, 70% AW, and 40% AW) for two months. Results indicated that drought stress significantly reduced shoot and root fresh and dry weights, root length, and total dry weight at both moisture levels of 40% AW and 70% AW. Also, a significant decrease was observed in leaf relative water content at the moisture level of 70% AW, and chlorophyll a, chlorophyll b, and total chlorophyll contents only at the moisture level of 40% AW. In this study, inoculation with *Funneliformis mosseae* induced a significant increase in shoot and root fresh weight, root dry weight, total plant dry weight, and root/shoot dry weight ratio at both drought levels. Root length at 70% AW level and shoot dry weight at 40% AW level in mycorrhizal plants were significantly higher than non-mycorrhizal plants. Moreover, the contents of chlorophyll a, chlorophyll b, and total chlorophyll of AM plants at the control and 40% AW moisture levels were about 20 and 50% significantly higher than the corresponding NM plants, respectively. The results showed that mycorrhizal inoculation of the plant could increase the photosynthetic capacity resulted in the improvement of host plant growth characteristics under drought stress.

Keywords: *Funneliformis mosseae*, osmotic stress, Valerian, biomass, chlorophyll content

PP73 Ethnobotanical study of medicinal plants in Sian Sofla village, Khomein city, Markazi province

Farzaneh Banderkhani[*1], Fatemeh Rabizadeh[1] -*1. Depaetment of biology, Women university of Semnan (Farzanegan), Semnan, Iran.*

Botany or ethnobotany is the retrieval of traditions that are unwritten and in danger of extinction. From time immemorial, humans have depended on plants for their basic needs and existence. Our plants have evolved from one generation to the next by transferring more sophisticated knowledge of plants and their usefulness. Access to latent and undocumented experiences and information is one of the valuable strategies for the development of pharmaceutical sciences and the basis for the production of new drugs. The use of plants as medicine is part of the plant of the indigenous peoples that has formed over the centuries in rural areas. This knowledge is a good guide in discovering new drugs in modern medicine. This study identifies and studies the native plants of Sian Sofla village in Markazi province. Lower Sian is a village in the central part of Khomein city in the central province of Iran. This village is located in Hamzeh Lou district and is located 22 km away from Khomein and 60 km away from Arak. The study of medicinal plants in this area has been done based on personal interviews and documentary studies. In this study, 49 species of medicinal plants belonging to 24 plant families were identified, which are effective in treating and improving gastrointestinal diseases and colds and kidney diseases, inflammation and allergies and infections, and strengthening the gastrointestinal tract. For each plant, the scientific name, local name, medicinal properties, organs used and how it is commonly used among the villagers are also stated. This village has a small area compared to the study and optimal use of these natural resources can be a good source for identification and use of medicinal plants, some plants such as mint, safflower, borage due to its high consumption in this village mainly below They are cultivated.

Keywords: Botany, Medicinal Species, Native, Mint, Safflower

PP74 Evaluation of cyanobacterial treatments on the antioxidant enzymes activities in *Melissa officinalis* L. as a medicinal plant

Narges Moradi[1], Seyedeh Batool Hassani*[1],-Hossein Riahi [1],-Zainab Shariatmadari [1], Majid Ghorbani Nohooji [2] –*1*. *Faculty of Life Sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran,2. Medicinal plant Research center, Institute of medicinal plant, ACECR, Karaj, Iran. E-mail: b_hassani@sbu.ac.ir*

The use of microalgae and their active ingredients is important in order to increase the essential oil of some medicinal plants. *Melissa officinalis* L. is a perennial plant which its leaves and aerial parts have medicinal value. The aim of this study was to evaluate the changes in the activity of antioxidant enzymes (peroxidase and superoxide dismutase) and the amount of H_2O_2 in the medicinal plant under the influence of cyanobacteria (*Nostoc* sp. and *Spirulina* sp.) as elicitors after 83 days. Based on the results, *Nostoc*-treated plants showed the lowest activity of peroxidase and superoxide dismutase enzymes and the highest amount of H_2O_2. Also, in plants treated with *Spirulina*, the amount of H_2O_2 increased because of reducing the activity of antioxidant enzymes. The highest activity of antioxidant enzymes and the lowest amount of H_2O_2 were obtained in control plants (water- treated plant). Therefore, treatment of *Melissa officinalis* with *Nostoc* and *Spirulina* cyanobacteria has led to stress conditions (increased H_2O_2) in this plant. Considering that one of the ways to increase the essential oil in medicinal plants is to create stress conditions in them, so it seems that the active component has been increased in plants treated with these cyanobacteria, which requires further analysis in this field.

Keywords: *Nostoc*, *Spirulina*, Peroxidase, Superoxide desmutase, *Melissa officinalis*

PP77 Reintroduction of *Bromus rechingeri* within *Bromus pectinatus* complex (Poaceae: Bromeae) and confirm its presence in Iran

Akram Nasiri[1*], Shahrokh Kazempour Osaloo[1], Behnam Hamzeh'ee[2] -*1. Department of Plant Biology, Faculty of Biological Sciences, Tarbiat Modares University, Tehran 14115-154, 2. Department of Botany, Research Institute of Forests and Rangelands, Tehran 13185-116. E-mail: anasiri89@yahoo.com*

Bromus pectinatus complex, one group of tetraploid species belong to sect. *Bromus*, are morphologically intermediate between sects. *Bromus* and *Genea*. This complex was introduced with six species distributed

in middle east country, but because of the overlap of distinguishing characters, its taxa was reduced to four species. *Bromus rechingeri* Melderis is one of the species that considered as a synonym of *B. pulchellus* in the process of reducing *B. pectinatus* complex taxa. This species was introduced in Flora Iranica as endemic of Iran and Afghanistan. In comprehensive global study of *Bromus* genus, herbarium voucher *B. rechingeri* TARI 9465 from Zahedan was investigated base on morphological characters and molecular datasets. The voucher specimen was checked by using identification keys. DNA extraction of all specimens was performed using Plant DNA kits. Nuclear ITS and ETS and, plastid matK regions were amplified using specific primer pairs and then, PCR products were sequenced. Our morphological investigation confirmed that the voucher TARI 9465 belongs to *B. rechingeri* species. Also, the comparison of nuclear and plastid sequences of this specimen with the sequences obtained from *B. pulchellus* voucher specimens TARI 42671 from Zahedan and TARI 42671 from Kuhe-Khezr indicated significant genetic differentiation between two species. The result of this study confirms the presence of *B. rechingeri* as a distinct species belongs to *B. pectinatus* complex in Iran. Survey of additional specimens identified as *B. rechingeri* and NGS of the whole plastid genome would be valuable and may provide more information.

Keywords: *Bromus rechingeri*, *Bromus pectinatus* complex, identification key, morphological characters, molecular data

PP78 Principal component analysis of essential oil compounds of *Rydingia michauxii* at the dormant, vegetative and flowering stages

Aminallah Tahmasebi[1*], Akbar Karami[2], Seyed Morteza Hosseini[3] -*1. Department of Agriculture, Minab Higher Education Center, University of Hormozgan, Bandar Abbas, Iran; 2. Department of Horticultural Science, College of Agriculture, Shiraz University, Shiraz, Iran; 3. Medicine, Quran and Hadith Research Center, Baqiyatallah University of Medical Sciences, Tehran, Iran. E-mail: Tahmasebi.info@yahoo.com*

Rydingia michauxii belonging to the Lamiaceae family, is an herb used in Iranian traditional medicine. *Rydingia* is traditionally used for treating a number of diseases including diabetes, arthritis, gastric discomfort, headache and rheumatism. Various parts of *R. michauxii* (roots, leaves, stems and flowers) were collected at the three developmental stages (dormant, vegetative and flowering) in Kazeroun, Iran. The essential oil was isolated by a Clevenger–type hydro-distillation apparatus and chemical composition of essential oil was determined by gas chromatography/mass spectrometry (GC/MS). Principal component analysis (PCA) was conducted to evaluate the degree of phytochemical variations according to a correlation matrix of *R. michauxii* compounds at the three developmental stages. PCA indicated two components with 100% of the total variance. The first and second components (PC1 and PC2) revealed 56.7% and 43.3% of the total variation, respectively. The PC1 consisted of compounds including eugenol, eugenol acetate, carvone, geraniol, 1,8-cineole, myrcene, myrtenol, -cadinene and bornyl acetate. Moreover, the PC2 included compounds such as trans- -bergamotene, -guaiene, methyl eugenol and linalool. Biplot analysis of the chemical compounds of PC1 and PC2 showed that dormant, vegetative and flowering stages are placed into three different groups representing the diversity in essential oil compounds during the growth stages.

Keywords: Correlation matrix of compounds, Developmental stages, *Rydingia michauxii*

PP79 Evaluation of antifungal activity of *Rydingia michauxii* extracts at the three different growth stages

Aminallah Tahmasebi[1*], Akbar Karami[2], Seyed Morteza Hosseini[3] -*1. Department of Agriculture, Minab Higher Education Center, University of Hormozgan, Bandar Abbas, Iran; 2. Department of Horticultural Science, College of Agriculture, Shiraz University, Shiraz, Iran; 3. Medicine, Quran and Hadith Research Center, Baqiyatallah University of Medical Sciences, Tehran, Iran. E-mail: Tahmasebi.info@yahoo.com*

Rydingia michauxii (Lamiaceae) is an endemic herb to Fars province, Iran, traditionally employed for treating a wide number of human diseases. In the present study, the antifungal activity of *R. michauxii* methanolic extracts at the dormant, vegetative and flowering stages was evaluated on a number of fungi (*Rhizoctonia solani*, *Bipolaris micropus*, *Fusarium solani* and *Fusarium oxysporum*). The antifungal activity of *R. michauxii* extracts was assessed by the minimum inhibitory concentration (MIC) method

according to p-iodonitrotetrazolium chloride assay. The MIC was recorded as the first concentration of the plant extract with no color change of the medium showing no bacterial growth. The average MICs displayed by the *R. michauxii* extracts showed that *R. solani* and *F. oxysporum* had the most sensitivity (18.67 mg/ml) and resistance (24 mg/ml) to the extracts, respectively. It seems that differences in content and amount of compounds of *R. michauxii* extracts at the various growth stages are responsible for the level of antifungal activity.

Keywords: Fungi, Minimum inhibitory concentration, Plant extract, *Rydingia michauxii*

PP80 Study of heritability and genetic efficiency in advanced sesame lines using REML/BLUP approach

Hossein Zeinalzadeh-Tabrizi [1*], Sadollah Mansouri [2] -*1. Ardabil Agricultural and Natural Resources Research and Education Center, Agricultural Research, Education and Extension Organization (AREEO), Ardabil (Moghan), Iran; 2. Department of Oilseed Crops, Seed and Plant Improvement Institute (SPII), Agricultural Research, Education and Extension Organization (AREEO), Karaj, Iran. E-mail: h.zeinalzadeh@areeo.ac.ir*

Estimation of heritability is crucial in choosing the breeding path of different traits in crop plants. To study heritability and genetic efficiency in 14 advanced sesame lines and Oltan cultivar as check variety, an experiment was performed using a randomized complete block design with four replications at Moghan Agricultural Research Station during the 2017-2018 crop years. During the experiment, traits including the number of days to flowering, growth period, plant height, number of capsules per plant, capsule length, 1000-seed weight, seed, and oil yield were recorded. The restricted maximum likelihood (REML)/Best Unbiased Linear Prediction (BLUP) approach was used to estimate genetic parameters, heritability, and genetic advance in advanced sesame lines using R software package. The results showed a significant positive genetic correlation between the number of days to flowering with growth period, seed yield with oil yield, the number of capsules per plant with oil yield, and the number of days to flowering with plant height at 0.01 percent probability level. The lowest and highest broad-sense heritability belonged to the growth period (0.12) and 1000-seed weight (0.71). The maximum and minimum genotypic and phenotypic coefficients of variations belonged to oil yield (15.08 and 18.15) and growth period (0.60 and 1.74). The highest genetic advance and genetic advance as a percentage of the mean (GAM) were observed in seed (277.07 and 24.24) and oil (152.50 and 25.80) yield traits. It can be concluded that the selection approach in sesame breeding lines has the maximum efficiency in achieving the desired high-yielding genotypes in its breeding program.

Keywords: Breeding, Genetic advance, Genetic parameters, Selection, Yield

PP81 Phylogenetic Systematics of genus *Arnebia* Forssk. (Boraginaceae-Lithospermeae)

Shokouh Esmailbegi Kermani[1]* - *Department of Biology, Faculty of Science, Urmia University, Urmia, Iran. E-mail: sh.esmailbegi@urmia.ac.ir*

Arnebia is an Old-World genus of Boraginaceae with some 30 species distributed in North Africa and Southeast Europe eastward into central Asia, with eight species native to Iran. It apparently has a close relationship with *Huynhia*, *Macrotomia*, and *Stenosolenium*, but so far, no study included these four genera and therefore, their relationship remain ambiguous. Because of their characteristic distyly, self-incompatibility, and aneuploidy, their relationships is further complicated. The countless medicinal properties that have been reported for at least seven species of *Arnebia* have increased the importance of its study .In this study, it was tried to investigate the interspecific relationship of genus *Arnebia* and study the relationship among the above allied genera based on morphology and phylogeny. Following current results, new classification was introduced.

Keywords: Taxonomy, Phylogeny, *Arnebia*, Boraginaceae

PP82 Taxonomy and cytology study of genus *Arnebia* Forssk. (Boraginaceae-Lithospermeae)

Shokouh Esmailbegi Kermani[1*] -*1. Department of Biology, Faculty of Science, Urmia University, Urmia, Iran.*
E-mail: sh.esmailbegi@urmia.ac.ir

Since several studies have been performed to determine the tribal relationships of the family Boraginaceae as well as the genera relations within the tribes, but no comprehensive studies have been performed on the genus *Arnebia*. And all studies have been limited to comparing one or more representatives of the species of this genus. Although Boraginaceae cytology studies show the polyploidy does not a significant role in its evolution, aneuploidy plays an important role in this direction. To comply with other members of the family, it appears that aneuploidy has a major impress in *Arnebia* speciation. Among the 8 species of *Arnebia* which grow in Iran, only four species have been reported chromosome numbers yet, and the numbers have varied from n = 4 to n = 11 .In the present study, the chromosome count of its species was investigated from different regions. Due to its medicinal application, determining inter-species relationships through cytology helps to designate the species boundaries. Because of common aneuploidy in the Boraginaceae and the *Arnebia*, this genus could be a nice delegate in morphological trait diversity and molecular biology studies. The most important usage of the present study is to understand the diversity and define the species boundaries of this genus.

Keywords: Taxonomy, Cytology, *Arnebia*, Boraginaceae

PP83 Taxonomy and cytology study of genus *Phlomis* s. str. in Iran

Shokouh Esmailbegi Kermani[1*] -1. *Department of Biology, Faculty of Science, Urmia University, Urmia, Iran.*
E-mail: sh.esmailbegi@urmia.ac.ir

Lamiaceae is a large group of angiosperms in the Euasterid I order Lamiales that is easily identified by morphological characters. *Phlomis* L. is one of large group of lamioid mints which is easily recognized. *Phlomis* sensu lato as a lamioid group, but this morphology is not variable enough within the genus to make an infrageneric classification simple. As early as 1794 Moench recognised morphological differences within *Phlomis* that he believed to be characteristic enough to split the taxon into two separate genera, *Phlomis* and *Phlomoides* (Moench 1794). These features have also been recognised by many other authors, and the discussion since has been to which level in the taxonomic hierarchy the two *Phlomis* groups should be assigned. The genus *Phlomis* s.l. has a wide distribution from China through Eurasia to the Mediterranean. Two centres of diversity can be recognised, south and east Anatolia and NW Iran, where all species belong to the *Phlomis* group and from the Central Asian parts of the old Soviet to E China, where all species of the group *Phlomoides* occur. In present study, to achieve taxonomic information Flora Iranica, Flora of Iran and Flora of Turkey were investigated and seeds and flower buds were fixed to study the chromosome number. The division of *Phlomis* species into two groups has been based on several traits, including habit (the *Phlomis* group are shrubs or sub-shrubs, while members of the group *Phlomoides* are herbaceous), certain leaf characters, the shape, and colour of the corolla and strong cytological data. The two groups within *Phlomis* differ also in chromosome number. The *Phlomis* group generally is 2n=20 while the *Phlomoides* group is 2n=22. The chromosomes in section *Phlomis* are also larger than those of section *Phlomoides*.

Keywords: Taxonomy, Chromosome number, *Phlomis*, Lamiaceae

PP84 Comparison of DNA extraction methods in medicinal Plant *Peganum harmala* L.

Zahra Salehi[1], Arezou Rezaei[1,2*], Atefe Amirahmadi[1,2], Parisa Farrokh[1,2], Javad Ghasemian[3] -*1. School of Biology, Damghan University, Damghan, Iran, 2. Institute of Biological Sciences, Damghan University, Damghan, Iran, 3. School of mathematics and computer sciences, Damghan University, Damghan, Iran. E-mail: arezaei@du.ac.ir*

The identification of genetic, morphological and ecological characteristics of plants is essential for the economic and health exploitation of plant products and the extraction of a high quality DNA is one of the ways. However, DNA extraction with good quality and high efficiency from plant tissues is difficult due to the presence of hard polysaccharide cell wall, pigments and some secondary metabolites. It is noteworthy,

secondary metabolites which usually cause medicinal properties, may also prevent the extraction of DNA of appropriate quality and quantity. Although, the basis for DNA extraction is the same, due to the diversity of components of different tissue, the same method cannot be used to extract DNA from all plant species. A more desirable method not only provides the right DNA in terms of quantity and quality, but also is low cost and without the need for advanced laboratory equipment. In this study, five DNA extraction methods, including CTAB (Doyl & Doyl), its two modified methods, the modified Murray and Thompson method, and the kit Gene All were compared in both fresh and dried leaves of *P. harmala*. The quantity and quality of the isolated DNAs were evaluated using spectrophotometry and agarose gel electrophoresis. The suitability of obtained DNAs for molecular studies was evaluated by PCR of ITS fragments in the nuclear ribosomal DNA and trnL-F region in the chloroplast genome. Based on the findings, the changes in the main CTAB method, such as the elimination of beta-mercaptoethanol or ammonium acetate, had no negative effect on the quantity or quality of the extracted DNA or PCR results. The PCR of ITS fragments and trnL-F region was successfully performed in all DNAs obtained from both fresh and dried leaves of *P. harmala*. Therefore, in the case of *P. harmala,* all the studied methods can provide DNA suitable for PCR studies.

Keywords: PCR, CTAB, Murray and Thompson, Secondary metabolites, *P. harmala*

PP85 The effect of chitosan nanoparticle and salicylic acid on the lifespan of white and red gerbera cut flowers

Mahdieh Salimi[1], Mohammad Reza Ghalambaran[1], Seyedeh Batool Hassani[1]*- *Faculty of Life Sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran. E-mail: b_hassani@sbu.ac.ir*

Gerbera jasemonii belongs to the Asteraceae and is one of the most important cut flowers in the world with a high variety of colors. Various factors such as nutrient deficiency, bacterial and fungal contaminations and water stress cause short lifespan of cut flowers. In the present study, the effect of 1% chitosan nanoparticles and 3 mM salicylic acid on the lifespan of white and red gerbera cut flowers was investigated. The cut flowers were placed in solutions containing 1% chitosan nanoparticles and 3 mM salicylic acid immediately after cutting and transfer from the greenhouse. The results showed that the white and red cut flowers which stored in 3 mM salicylic acid had a 6-day longer lifespan than the control samples (kept in water). Also, 1% chitosan solution increased the lifespan of red and white cut flowers by 5 and 4 days, respectively, compared to the control. During the study of catalase activity and malondialdehyde content, it was found that keeping cut flowers of white and red gerberas in 3 mM salicylic acid solution increased catalase activity and decreased malondialdehyde. Therefore, 3 mM salicylic acid treatment can be considered as a solution for storing gerbera cut flowers to delay the aging process of the cut flowers.

Keywords: Bacterial contamination, catalase, flower senescence, fungal contamination, malondialdehyde

PP86 Stimulation of secondary metabolites production in *Zataria multiflora* cell suspension culture through elicitation with salicylic acid

Khadieh Bavi[1*], Ramazan Ali Khavari-Nejad[1], Farzaneh Najafi[1], Faeze Ghanati[2] *-1.Department of Plant Sciences, Faculty of Biological Sciences, Kharazmi University, Tehran, Iran, 2. Department of Plant Biology, Faculty of Biological Sciences, Tarbiat Modares University (TMU), Tehran, Iran. E-mail:Kh.bavi.pphy@gmail.com*

Zataria multiflora (Lamiaceae) is medicinal plant with a wide range of biological properties due to having phenolic compounds such as polyphenols and terpenoid compounds. Induction of secondary metabolites in plant cell culture systems by elicitors is one of the most important strategies to improve the production of medicinal metabolites. In the present study a cell line was established from *Z. multiflora* in B5 medium and the effects of salicylic acid (SA) at 90, 180 and 360 µM on suspension-cultured cells was evaluated. The cells were treated at their logarithmic growth phase for 3 days and the activity of regulatory and antioxidant enzymes, also the major phenolics were determined by HPLC and spectroscopy techniques. The results showed at 90 and 180 µM of SA, growth of *Zataria* cells significantly reduced (87.62% and 72.60% of the control group, respectively). Salicylic acid treatment lead to increase in the activities antioxidant enzymes such as superoxide dismutase (SOD), catalase (CAT), peroxidase (POX) as well as nitric oxide (NO) content compared with control. Increase of *signal molecules* in SA elicitation is important, because these

molecules trigger signal transduction pathways to induce regulatory enzymes such as PAL and TAL to increase the secondary metabolites accumulation in Zatria cells. SA at 90 and 180 µM concentrations significantly enhanced the activity of PAL (about 1.2 fold), TAL (1.3 - 1.4 fold) and PPO (1.5 - 1.7 fold) as well as total contents of phenol (5.79 and 4.38 mg g^{-1} FW) compared to control respectively. PAL and TAL enzymes involved in the phenolic pathway which lead to shift from primary to secondary metabolism. SA induced the production of 4-hydroxy benzoic acid, benzoic acid, epicatechin and syringic acid in *Zataria* cell. This study indicates that cell suspension culture could be used as an efficient system for sustainable production of medicinal compounds.

Keywords: *Zataria multiflora*, , abiotic elicitor, nitric oxide, phenolic compounds, antioxidant enzymes

PP87 The Effects of Hydroalcoholic Extract of *Artemisia absinthium L* on Blood Glucose in Diabetic Rats

Zahra Zare[1], Amirhosein Maboudi [2] – *1. Assistant Professor, Department of Biology, Farhangian university, Tehran , graduated, 2. Department of Biology, Farhangian university, Tehran. E-mail: amirmbd2014@gmail.com*

Nearly 5 million people in Iran have diabetes and this number reaches 400 million worldwide. Researchers are looking for drugs with less side effects to control diabetes. *Artemisia absinthium L* has many medicinal uses and is found in most cities of Iran. In this study, we investigated the effect of its hydroalcoholic extract on diabetic rats. In this Research 40 male Wistar rats (200-250 g) randomly divided into 5 equal groups. Normal Control, the control group received the hydroalcoholic extract of *Artemisia absinthium*, control diabetic and Two treatment diabetic groups received 80 and 120 mg/Kg of hydroalcoholic extract of *Artemisia absinthium*, respectively. to induce diabetes in the control diabetic and Diabetic Treated, streptozotocin (60 mg / kg) was injected intraperitoneally. All rats were treated orally by gavage which continued daily for 3 weeks. Finally, was measured the level of glucose of the animal s serum. Blood glucose levels were significantly lower in the extract-treated groups than in the diabetic control group. The decreasing effects increased with increasing of the amount of extract. Animal weight was also increased in all groups treated with the extract. .The extract of *Artemisia absinthium*, due to the presence of flavonoid compounds and polyphenols, has a lowering effect on blood glucose.

Keywords: Diabetes, Streptozotocin, Medicinal plant

PP88 Evaluation of water quality using algal species composition of diatoms and estimate of biomass in the River Mordagh , NW- Iran

Maryam Rezazadeh[1*], Ehsan Atazadeh[2] -*1. Student in Plant Biology, Faculty of Natural Sciences, University of Tabriz, Iran, 2. Assistant Professor, Department of Plant Biology, Faculty of Natural Sciences, University of Tabriz, Iran. E-mail: maryamreza048@gmail.com*

Algae are one the primary producers in food web on the earth. Algae have many applications in assessment and evaluation of water quality in rivers and any other aquatic ecosystems. Among the algae, diatoms have a very important role in river water quality assessment because they response to any physical, chemical and biological changes in those aquatic ecosystems. This study was focused on the diatom flora of the Mordagh river and the effects of the ecological and climatic factors on biodiversity and frequency. In order to study, the samples were collected in 4 sites during four different seasons in 2019-2020.Samples were treated with hot H2O2 (35%) and HCl (35%) to remove the organic materials and clean up the frustules of the diatoms. In this study, physicochemical factors such as PH, DO, EC were measured. Diatoms were identified using light microscope. The results showed that the most dominant taxa in the river were *Nitzschia amphibia*, *Diatom vulgaris*, *Gomphonema* sp. Furthermore, the results showed that *Nitzschia amphibia* had high dispersal in spring due to high precipitation whilst *Diatoma vulgaris* had high dispersal in autumn due to low flow in the river. This study is very substantial and important in diatom flora of Iran.

Keywords: Mordagh river, Ecology, Taxonomy, Diatoms

PP89 Investigation of compatible soluble synthesis as a adaptation strategy of *Amygdalus haussknechtii* L. plant under stress

Ali Parvizi[1], Ali Asghar Hatamnia[1*], Nayer Mohammadkhani[2], Hamid Reza Naji[3] -*1. Department of Biology, Ilam University, Ilam, Iran; 2. Shahid Bakeri High Education Center of Miandoab, Urmia University, Urmia, Iran; 3. Department of Forest Sciences, Ilam Universit, Ilam, Iran. E-mail: a.hatamnia@ilam.ac.ir*

In this study, the analysis of compatible soluble compounds such as content of total soluble sugar, proline and total protein as one of the adaptation mechanisms of *Amygdalus haussknechtii* L. under stress at three different altitude level of Qalajeh mountain in Ilam province was evaluated. The results indicated that with increasing altitude altitude, the amount of net photosynthesis decreased from 3.26 to 1.56 (μmol / m^2.s), and the transpiration varied between 0.80 to 1.50 (mmol / m^2.s). The results showed that with increasing altitude, the amount of total sugar, proline and protein compounds increased significantly ($p<5$). So that the amount of soluble sugar compounds from 43.91 to 51.94 (mg / g dry weight), the amount of proline from 3.13 to 3.89 (mg / g dry weight) and total protein from 3.29 to 4.16 (mg / g dry weight) increased. There is a significant negative correlation ($p<1$) between these compounds and photosynthetic parameters (net photosynthesis and transpiration), which indicated the importance of these compounds in plants under strss and as one of the most important adaptation strategies in plants.

Keywords: Total soluble sugar, Total protein, Proline, Stress

PP90 Effect of silicon dioxide and nano silicon dioxide on seed germination indices of *Cucurbita pepo*

Fatemeh Nejadhabibvash[1*], Zeinab Rashidi[2], Arsalan Pirvash[2] -*1. Department of Biology, Faculty of Science, Urmia University, Urmia, Iran, 2. Department of Medicinal Plants, Shahid Bakari Highe Education Center of Miandoab, Urmia University, Urmia, Iran. E-mail: f.nejadhabibvash@urmia.ac.ir*

The pumpkin belongs to the family Cucurbitaceae. The bush is a one-year-old plant with fleshy fruits and usually oval seeds [1-2]. In order to investigate the effect of silicon dioxide and nano silicon dioxide on experimental pumpkin germination in a completely randomized design with three-dose silicon dioxide treatments (10, 30 and 60 mg / L) and nano silicon dioxide Three levels (10, 600 and 60 mg/L) were performed in 3 replications in 2020. The studied traits were: germination percentage, germination rate, germination index, seed vigor index, bud length, bud diameter, fresh weight, dry weight and number of buds. The results showed that treatments had significant effect on germination percentage, germination rate, germination index, seed vigor index and number of buds at 1% probability level but not on germination length, bud diameter, fresh weight and dry weight. The highest germination percentage, germination rate, germination index, seed vigor index and number of buds were observed in silica treatment at concentrations of 10 and 30 mg / L. According to the results of this experiment, application of silicon dioxide on pumpkin seeds can provide faster germination and stronger seedlings.

Keywords: Germination percentage, silicon dioxide, seeds, pumpkin

PP91 Effect of sodium chloride on seed germination and early seedling growth of *Beta vulgaris* L.

Fatemeh Nejadhabibvash[*]- *Department of Biology, Faculty of Science, Urmia University, Urmia, Iran.*
E-mail: f.nejadhabibvash@urmia.ac.ir

Seed germination is usually the most critical stage in seedling establishment, determining successful crop production. *Beta vulgaris* L., belonging to Chenopodiaceae family, has ancestors of halophytes. Salinity stress at germination stage is a reliable test for evaluating of tolerance in many species. Hence; this experiment was carried out to evaluate salinity tolerance of *Beta vulgaris* L. grown at 5 salinity levels (0, 100, 150, 200 and 250mM of NaCl). Experiment was conducted at completely randomized design with 4 replications. The seeds were sterilized in sodium hypochlorite 10 % (w/v) for 10 min and rinsed several times (5-6) with sterilized deionized water. The number of germinated seeds was counted daily for ten days. Germination rate and percentage, length and fresh weight of plumule and radicle and seedling vigor index were examined. Analysis of variance was performed using ANOVA and mean comparisons were performed using Duncan test at 5% probability level using SPSS software version 16. Sodium chloride induces stress

by reducing plant growth due to changes in internal processes in the plant. As concentration of NaCl decreased, the rate and percentage of germination, length and fresh weight of radicle & plumule fresh weight and seedling vigour index increased. Some researchers believe that salinity stress affects seed germination by increasing osmotic pressure and decreasing water uptake by seeds, as well as by the toxic effects of sodium and chlorine ions.

Key words: salinity, seedling, radicle length

PP92 Downregulation of Zn-transporters along with Fe and redox imbalance causes growth and photosynthetic disturbance in Zn-deficient tomato

Maryam Haghmadad Milani[1], Mir Mohammad Farajzadeh[2], Ahmad Humayan Kabir[3], Gholamreza Gohari[4] *-1. Department of Biology, Faculty of Sciences, University of Maragheh, Maragheh, Iran, 2. Department of Biology, Faculty of Sciences, University of Shahid Madani Azarbayian, Azarshahr, Iran, 3. Department of Botany, University of Rajshahi, Rajshahi 6205, Bangladesh;4. Department of Horticultural Sciences, Faculty of Agriculture, University of Maragheh, Maragheh, Iran. E-mail: maryam_hmilani@yahoo.com*

Zinc (Zn) deficiency hinders growth and development in tomato. This study unveils the responses of how Zn starvation affects physiological and molecular processes in tomato. Zn-sensitive tomato cultivar (cv. Ratan) was used for this study. The sprouted three-days homogeneous plantlets thereafter were transferred to the hydroponic solution at pH 6.0. Furthermore, ZnSO4 has been used as follows8: 2.0 µM (Zn-sufficient or control) and 0.01 µM (Zn-deficient). The selected plants were grown in a plastic container (8 L) having 3 plants/per in indoor growth. We opted for a completely randomized block design (CRBD) in plant cultivation. Three independent biological replications were considered for data analysis. Zn deficiency negatively affected the biomass, cellular integrity, and chlorophyll synthesis in tomato. Also, Zn deficiency decreased the maximum yield of PSII, photosynthesis performance index and dissipation energy per active reaction center, although the antenna size, trapping energy efficiency and electron transport flux were stable in Zn-starved leaves. Further, Zn shortage caused a substantial reduction in Zn and Fe concentrations in both roots and shoots along with decreased root Fe-reductase activity accompanied by the downregulation of *Fe-regulated transporter 1*, *Zn transporter-like (LOC100037509)*, and *Zn transporter (LOC101255999)* genes predicted to be localized in the root plasma membrane. The interactome partners of these Zn transporters are predominantly associated with root-specific metal transporter, ferric-chelate reductase, *BHLH* transcriptional regulator, and Zn metal ion transporters, suggesting that Zn homeostasis may be tightly linked to the Fe status along with *BHLH* transcription factor in Zn-deficient tomato. We also noticed elevated $O_2^{\cdot-}$ and H_2O_2 due to Zn deficiency which was consistent with the inefficient antioxidant properties. These findings will be useful in the downstream approach to improve vegetable crops sensitive to Zn-deficiency.

Keywords: Nutrient elements; redox status; tomato; Zn transporters

PP93 Effect of carbon dot nanoparticles on sesame seeds

Parinaz Akbari Zarrinkolaei[1], Ehsan Nazifi[1*],Zeinab Rahmani[2],Bagher Seyed Alipour[3] *-1. Department of Plant Sciences, 2. Department of Organic Chemistry; 3. Department of Cellular and Molecular Biology; University of Mazandaran.*
E-mail: e.nazifi@umz.ac.ir

Carbon dots are indeed small carbon nanomaterials with low toxicity, good biocompatibility, good solubility in water and widespread availability. Carbon dots are smaller than other carbon nanoparticles that can be absorbed by the roots. Then, they enter cells and nuclei and interact with DNA to affect gene expression. Considering the importance of Cultivation of oil plants, in this study, the effect of carbon nanoparticles on the growth parameters of sesame was investigated. The nanoparticles were synthesized from plant tragacanth gum hydrothermally. TEM images obtained from carbon dots showed an almost spherical shape with an average diameter of 1-1.5 nm. The XRD pattern showed a width peak at 2θ of about 25.8° and 38.8°, which is related to the amorphous structure and graphite section of carbon dots. Carbon dots at concentrations of 0, 5, 10, 50 and 100 mg l^{-1} were added to Petri dishes containing 10 sesame seeds. Seedlings were harvested after 7 days and some growth indicators were measured. Parameters of wet weight, seedling length and root length showed significant differences between different concentrations; as the concentration of 50 mg l^{-1} showed the highest values. Concentration of 10 mg l^{-1} showed the highest

amount of chlorophyll a, b and carotenoids compared to other concentrations; however, there was no significant difference between different concentrations. Considering that the growth indicators in all treatments increased compared to the control, it seems that Carbon dots will have a positive effect on sesame plant growth; however, more research is needed in the later stages of development.

Keywords: Seedling length, photosynthetic pigments, growth indicators, fresh weight

PP94 The antifungal effect of thionin-like peptide (ThiL20) against pathogenic fungus of *Botrytis cinerea*

S.A. Sarani*[1] , H. Bohlmann[2] -*1.Department of Plant Protection, Faculty of Agriculture, University of Zabol, Zabol, 2. Institute of Plant Protection, Department of Crop Sciences, University of Boku, Vienna. E-mail: saranisistani@gmail.com*

Botrytis cinerea is one of the most important plant pathogen fungi in most regions of the world. In this study, the antifungal activity of purified plant peptide of thionin-like (ThiL20) was investigated with different concentrations against main species of *Botrytis*. Thionin-like gene (At2g20618) was isolate from Arabidopsis and cloned in *E. coli* (strain C3030) carrying pETtrx1-a vector. The antifungal peptide was purified using reverse-phase high-performance liquid chromatography (RP-HPLC). The results of antifungal tests by adding to liquid broth culture with different concentrations using *in vitro* bioassay shown that the ThiL20 peptide had high antifungal activity and inhibitory effect and in 100 and 200 µg/ml had inhibitory effect completely against *Botrytis cinerea* species in comparison to control.

Keywords: inhibitory effect, plant antimicrobial protein

PP95 Design, construction, and optimization of a monophase RNA extraction solution (Threezol) from plant samples

Mozhdeh Arab[1], Seyyed Hamidreza Hashemipetroudi[2*] -*1. Department of Biotechnology and Plant Breeding, Sari Agricultural Sciences and Natural Resources University (SANRU), 2. Department of Genetic Engineering and Biology, Genetics and Agricultural Biotechnology Institute of Tabarestan (GABIT), Sari Agricultural Sciences and Natural Resources University (SANRU). E-mail: shr.hashemi@sanru.ac.ir; irahamidreza@yahoo.com*

In recent years, the importance of nucleic acid molecules (DNA and RNA) as ideal biomarkers in genetic detection, identification and diagnosis is well-understood. Extraction and purification of DNA and RNA biomolecules are considered as the first step of genomics, functional genomics and transcriptomics experiments. To achieve a quick, efficient and simple RNA isolation kit, the development of monophase RNA extraction buffer (Phenol-based) namely Threezol (Riragene) was considered in this investigation. To evaluate Threezol solution, total RNA was extracted from different plant species, including wheat (*Triticum aestivum* L.), cucumber (*Cucumis sativus* L.), rice (*Oryza sativa* L.), Aeluropus (*Aeluropus littoralis* (Gouan) Parl.), tomato (*Solanum lycopersicum* L.), sesame (*Sesamum indicum* L.) and soybean (*Glycine max* (L.) Merr.). The quality and quantity of the extracted RNA were assessed using agarose gel electrophoresis, spectrophotometric method, and quantification analysis of 18S rRNA by RT-qPCR method. Based on the 28S/18S rRNA ratio (28S > 18S) and OD260/280 ratio higher than 1.8, the extracted RNA from different plant samples had a similar quantity and quality with other commercial kits namely Trizol (Invitrogen) and RNAX Plus (Cinaclone). Based on RT-qPCR 18S rRNA analysis in different plant samples, Ct less than 18 was observed which could be an indication for the optimal quantity and quality of RNA extracted. The design, manufacture, and evaluation of these kits, while making the country self-sufficient in the production of this product, could be the starting point for the production and development of specific RNA/DNA extraction kits for animal and bacterial cells.

Keywords: Nucleic acid, Extraction kit, Threezol, RT-qPCR, Rragene

PP96 Effect of foliar application with methyl jasmonate on some physiological, phytochemical and antioxidant activity of *Physalis peruviana* L.

Sevda Mojarab[*1], Alireza Farokhzad[2] , Abolfazl Alirezalu[2] -*1. M. Sc. student, Department of Horticultural Sciences, Faculty of Agriculture, Urmia University, Iran, 2. Associate Professors, Department of Horticulture, Faculty of Agriculture, Urmia University, Iran. E-mail: sevdamojarab7572@gmail.com*

Physalis is one of the most important tropical fruits that has attracted worldwide attention due to its bioactive compounds, potential for intensive cultivation and good storage life. In recent years, the use of plant growth regulators to stimulate plant natural resistance has increased remarkably. In order to study the effect of foliar application with methyl jasmonate on some physiological, phytochemical and antioxidant activity of *Physalis peruviana* L., a pot experiment was conducted in a completely randomized design with three replications (two pots for each replication) in the research greenhouse of the Department of Horticulture, Urmia university. Different concentrations of methyl jasmonate (0, 1, 10 and 100 µM) were used in this study. The results showed that foliar application with methyl jasmonate had a significant effect on most of the evaluated traits. According to the results, content of leaf fresh and dry weight, total phenol, flavonoids, antioxidant activity, photosynthetic pigments of chlorophyll a and b, carotenoid, beta-carotene significantly increased compared to the control.

Keywords: Chlorophyll, Phenol, Flavonoid, fresh weight

PP97 Selenium Effects on Some Morphological and Biochemical Properties and Secondary Metabolites accumulation in Moldavian balm under Salt Stress

Bita Zaji[1*], Alireza Iranbakhsh[2], Shima Alaei[3], Nargol Salimi[4] -*1. Department of Biology, Kermanshah Branch, Islamic Azad University, 2. Department of Biology, Science and Research Branch, Islamic Azad University, 3. Department of Agronomy and Plant Breeding, Kermanshah branch, Islamic Azad University. 4. Human biology-health and disease Department, Toronto University, Canada. E-mail: bitazaji@gmail.com*

Salt stress is one of the vital reasons that adversely affect the productivity of crops, hence suitable approaches are needed to mitigate its negative effects on plants. Selenium (Se) is playing important roles in plant growth, secondary metabolite accumulation, stress responses and adaptation. Moreover, the dual response of Se on plant growth (beneficial or toxic) depends on its concentration. The mechanism of selenium-mediated salt tolerance has not been fully clarified. This study investigated the possible role of Se in regulating moldavian balm (*Dracocephalum moldavica* L.) salt tolerance. A pot experiment was conducted to investigate the role of Se (0, 5 and 10 µM, Na2SeO4) in growth, development, biochemical properties and secondary metabolite accumulation in moldavian balm plants grown at different levels of salt (0, 25, 50 and 75 mM, NaCl). As a result of the study it was demonstrated that all of the investigated parameters were affected by the applications of salt and Se. An increase in salinity led to reduction in fresh and dry weights of aerial parts and essential oil (EO) content while antioxidant enzyme activities, total phenol, flavonoids and anthocyanin contents increased depending on rising of the salt concentrations. Foliar application of selenium especially in the low concentration increased all the mentioned traits in stress conditions. In contrast, high level of selenium magnified the negative effect of salinity, so that the lowest value of growth parameters and EO obtained by 10 µM selenium under 75 mM NaCl. This study indicates that selenium at low concentration (5µM) plays a significant role in alleviating the harmful effects of salinity through increasing of antioxidant enzymes activities and total phenolic contents and consequently improved the function in Moldavian balm plants growing and EO content under salt stress.

Keywords: Anthocyanin, Oxidative Enzymes, Essential Oil, Flavonoid, Total Phenol

PP99 Effect of foliar application of different zinc sources on some phytochemical characteristics of Cape gooseberry (*Physalis peruviana* L.) fruits

Kamran Hassani[1], Abbas Hassani[2]*, Abolfazl Alirezalu[3], MirHassan Rasouli Sadaghiani[4] -*1, 2, 3. Department of Horticultural Science, 4. Department of Soil Science, Faculty of Agriculture, Urmia University. E-mail: a.hassani@urmia.ac.ir*

Zinc is an essential micronutrient element and has a number of vital roles in plants. In the recent years zinc nano-fertilizers have received considerable attention due to their increased uptake by plants as they are small in size and have high rate of penetration through plant cell membrane. Cape gooseberry (*Physalis*

peruviana L.) is a perennial herbaceous plant belonging to the Solanaceae family that its fruits have a high nutritional value due to the presence of phenolic compounds, vitamins, carotenoids, minerals and antioxidant properties. To study the effect of foliar application of different zinc fertilizers on some phytochemical characteristics of Cape gooseberry, a pot experiment was conducted as a randomized complete design with four replications. The treatments were three different zinc sources (zinc sulphate, zinc chelate and nano zinc chelate) in three concentrations (1, 2 and 3 g/l) and control (without fertilizer application). The results showed that foliar application of zinc had significant effect on evaluated parameters. Fruit weight, total phenolic and flavonoid content, antioxidant activity (by DPPH method), vitamin C and lycopene content in fruits increased with zinc application. The highest amount of measured traits was observed at a concentration of 2 g/l nano zinc chelate. Overall, the findings of this study showed that the effect of nano zinc chelate application (especially at a concentration 2 g/l) was more effective than zinc sulphate and zinc chelate in increasing yield and phytochemical characteristics of Cape gooseberry fruits.

Keywords: Antioxidant activity, Foliar application, Lycopene, Phenol, *Physalis peruviana*

PP100 Effect of salinity stress on growth and biochemical compounds of *Aeluropus littoralis*

Parisa Rasoulpour[1]*, Rouhollah Motafakkerazad[1], Seyed Yahya Salehi-Lisar[1], Amir Hosein Talebpour[2] *– 1. Departemnt of Plant Sciences, Faculty of Natural Sciences, University of Tabriz, Tabriz 2. Agricultural and Natural Resources Research Center of East Azerbaijan, Tabriz. E-mail: rasoulpourp@gmail.com*

Halophyte plants growing in slain environments, in some cases they have economic applications in addition to those potential to saline soil improvement. *Aeluropus littoralis* is one of the forage halophyte plants growing around the Omiya Lake. In this study, the effect of different NaCl levels (0 to 500 mM) on plant growth and biochemical composition including total soluble protein, phenolic compounds, flavonoids, sugars and phosphorus contents. The main aim of this study was determination of salinity level in which the plant shows higher economic value. It is higher to be determined. The results showed that the growth and protein content of shoots and roots of this plant decreased until to 300 mM of NaCl and then increased slightly. In contrast to insoluble sugar, the soluble sugar content increased and the highest amount was obtained in 300 mM of NaCl. Contrary to phosphorus concentrations, phosphorus content decreased. According to results it can be concluded that this plant has high sugar content and if the goal of plant cultivation is to achieve sugar, that cultivation at the level of 300 ml of sodium chloride is recommended. At higher salinity levels, this plant slightly increased phosphorus uptake. Therefore, mechanisms involved in phosphorus uptake will be investigated. In addition, antioxidant compounds including phenolic and flavonoid compounds increased in presence of salt, Therefore, the investigation of therapeutic value of these compounds and the possibility of this plant cultivation in the presence of 400 mM sodium chloride, which led to highest phenolic and flavonoid compounds, will be interesting.

Key Words: Phosphorus, total soluble protein, flavonoid, soluble sugar, phenolic compounds

PP101 Essential Oil Variation in Different Parts of Three Wild Populations of *Salvia abrotanoides* (Kar.) Sytsma

Mahboobeh Hassanpourfard[1], Parvaneh Abrishamchi[1*], Tayebeh Radjabian[2], Hassan Porsa[3] *-1. Department of Biology, Faculty of Sciences, Ferdowsi University of Mashhad, Mashhad, Iran, 2. Department of Biology, Faculty of Basic Science, Shahed University, Tehran, Iran, 3. Department of Legumes, Research Center for Plant Sciences, Ferdowsi University of Mashhad, Mashhad, Iran. E-mail: abrisham@um.ac.ir*

Caspian Russian sage, (*Salvia abrotanoides* (Kar.) Sytsma), is a valuable medicinal plant (Lamiaceae) that has been reported for biological properties like antioxidant, antibacterial, antiviral and antifungal activities. In the present study, essential oil (EO) diversity in three wild populations of *S. abrotanoides* from Khorasan Razavi province (Kalat, Dargaz and Torogh) was investigated. EO composition was analyzed by GC/MS, and clustering was performed by UPGMA method. In total, 35 different compounds, which accounted for 96.65-98.43% of the oil composition, were identified. Oxygenated monoterpens were the major contribution of EO. The highest amount of oxygenated monoterpens was found in the leaves and flowers

of Dargaz and Kalat populations, respectively. Four main constituents in the leaf EOs of all populations included 1,8-cineole (22.75-33.3%), camphor (14-27.11%), δ-3-carene (4.56-15.95%) and borneol (3.59-9.66%). Camphor and 1,8-cineole made up about 25% of the leaf EOs of Kalat and Dargaz populations. Ocimene and linalyl acetate (<0.5%) were identified in the leaf EOs of Kalat and Torogh, but were not observed in Dargaz population. α-Eudesmol (<0.1%) was only recognized in the leaves of Dargaz and Torogh populations. The concentration of α-terpinenyl acetate in the leaves of Torogh and Kalat populations was 9.15- and 6.65-fold of the value measured for Dargaz population, respectively. 1,8-cineole (23.13-24.68%), camphor (6.16-18.77%) and α-pinene (15.47-17.57%) were determined as the major constituents in the EO of flowers. The presence of p-cymene (<0.5%) in the flower was restricted to the Dargaz and Torogh populations. The amount of α-bisabolol in the flowers of Dargaz population was 6.04- and 3.02-fold of those obtained for Torogh and Kalat populations, respectively. Leaves and flowers were different in their EO components. These populations were distinctive based on the EO profile. Dargaz and Kalat populations, which clustered in a separate group, were phytochemically different from Torogh population, based on the leaf EO constituents.

Keywords: Caspian Russian sage, Clustering, Camphor, 1,8-Cineole, GC/MS

PP102 Evaluation the effect of BAP and NAA on callus production capacity of *Teucrium polium* L. *in vitro*

Mahshid Tabarifard[1], Monireh Cheniany[1*], Ali Ganjeali[1], Amin Allah Shoja[1] -*1*. *Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran. E-mail: Cheniany@um.ac.ir*

Teucrium polium is a medicinal plant endemic to Iran. Due to harsh environmental conditions, it is very difficult to propagate this plant through seed. Therefore, in vitro cultivation is essential for the conservation and propagation of this species. We investigated the effect of different concentrations of BAP and NAA on callogenesis (calli percentage, callus fresh and dry weight) of leaf explants in vitro. First, the leaves as explant was taken from the plant cultivated under hydroponic condition. The samples were sterilized and cultured on MS medium congaing different concentrations of BAP (0. 0.5, 1, and 1.5 mg L^{-1}) and NAA (0, 0.5, and 1 mg L^{-1}). The results showed that different hormonal levels have significant effects on calli percentage, fresh and dry weight of explants. The highest percentage of callus production (100%) was observed in MS containing "BAP" and "BAP+NAA" concentrations, but the greatest positive effect on the fresh and dry weight of calluses was in the combination of $BAP_{1.5}$ + $NAA_{0.5}$ (mg L^{-1}). It is worth noting that the lowest callogenesis traits was observed in the "NAA treatments". Therefore, MS medium with the combination of BAP and NAA is recommended for successful callus formation from the leaf explant of *T. polium*.

Keywords: *Teucrium polium*, Callus, Auxin, Cytokinin

PP103 SCoT-PCR optimization in *Halocnemum strobilaceum* L.

Mahyar Zahraei[1]*, Fatemeh Nasernakhaei[2] *-1. Department of Biology, Faculty of Science, Shahid Chamran University of Ahvaz; 2. Department of Plant Production Engineering and Genetics, Faculty of Agriculture, Shahid Chamran University of Ahvaz. E-mail: m-zahraei@stu.scu.ac.ir*

In this research, the PCR optimal conditions were studied for 12 primers of SCoT in *Halocnemum strobilaceum* L. Five parameters including, the temperatures and times for annealing and extension, PCR cycle numbers, the concentration of template DNA, voltage, and the optimal electrophoresis condition were evaluated. The result showed the PCR reaction procedure with a total volume of 20 µL with 60 ng template DNA was as follows: initiation at 94 ℃ for 4 min, denaturation at 94 ℃ for 1 min, annealing at 48.0 ℃~54.5 ℃ for 50 seconds (annealing temperature depend on different primer), extension at 72 ℃ for 1.5 min, 30-39 cycles, final extension at 72 ℃ for 10 min. Also, optimal electrophoresis condition was determined on 1.5% agarose gel at 98 v for one hour.

Keywords: Genetic diversity, Molecular marker, Optimal parameters

PP104 Identification and Quantification of Phenolic Compounds from Different Iranian Varieties Pomegranate Peel

Maryam Manzari Tavakoli[1], Samad Nejad Ebrahimi [1*], Hassan Rezadoost[1*], Mohammad Hossein Mirjalili [2], Mohammad Reza Vazifeshenas [3]-1. *Department of Phytochemistry, Medicinal Plants and Drugs Research Institute, Shahid Beheshti University, Tehran, Iran,* 2. *Department of Agriculture, Medicinal Plants and Drugs Research Institute, Shahid Beheshti University, Tehran, Iran,* 3. *Agriculture and Natural Resources Research Institute of Yazd Province, Yazd, Iran*. *E-mail: s_ebrahimi@sbu.ac.ir, h_rezadoost@sbu.ac.ir*

Pomegranate (*Punica granatum*) is one of the most consumed fruits in different parts of the world, including Iran, India, and Turkey. Peels of pomegranate have been reported as a rich source compound such as ellagitannins with antioxidant, anti-inflammatory, anti-hepatotoxicity, anti-atherosclerotic capacity, and antimicrobial properties [1,2]. In this study, the pomegranate samples were collected in September 2018 from mature bearing trees growing in the Agricultural Research Center of Yazd, Iran. The peels of different samples separated from arils and dried on the shadow at room temperature. The peels extracted using ethanol as solvent and the samples qualitatively and quantitatively analyzed by HPLC-DAD–ESI/MS. In total, 9 compounds were detected, among which ellagic acid (1.60-13.39 mg/g DW), ellagic acid derivatives (0.14-20.80 mg/g DW), punicalagin (13.87-48.69 mg/g DW) and, punicalagin derivatives (1.74-16.92 mg/g DW) were identified based on their UV spectra and fragmentation patterns in the mass spectra in different genotypes. Also, the antioxidant activity, total phenolic, and total flavonoid content were determined. The results showed high antioxidant activity (3.81-14.62 µg/ml), the polyphenol content (66.38-181.41 mg GAE/g) and, flavonoid content (38.5-144.13 mg RE/g) among different genotypes peel. The pomegranate peel is considered as an agro-waste but the present study provides evidence that the pomegranate peels are a potential source of natural antioxidant.

Keywords: Pomegranate Peel, Phenolic compounds, Ellagic acid, Punicalagin, Antioxidant capacity

PP105 Investigation the Changes in the Activity of Antioxidant Enzymes of Saffron Crocus Under Aluminum Stress

Molavi M, [1*], Baghaeifar Z., Saeidian Sh.[1] *-1. Department of Biology, Payame Noor University, 19395-3697 Tehran, Iran. E-mail: m.98molavi@gmail.com*

The aim of this study was to investigate the activity of antioxidant enzymes in saffron crocus under stress with aluminum. Aluminum is hydrolyzed to Al^{3+} cations (toxic form of aluminum) under acidic conditions, which is a limiting factor for growth and plant products. Although the mechanism of toxicity of aluminum is not completely understood, there are numerous reports of its role in the production of reactive oxygen species and the induction of oxidative stress. Saffron crocuses were grown in liquid culture medium, so that only the base of the crocus was below the water surface and then they treated with aluminum at concentrations of ۰/۲, ۰/۶, ۰/۸, ۱, ۲, ۲/۵, ۵, ۱۰and ۲۰mM. The saffron crocuses were then examined for the activity of guaiacol peroxidase, phenylalanine ammonia-lyase, superoxide dismutase, polyphenol oxidase and phenolic and proline content by Polle, Wang, Ries and Giannopolitis, Ghanati, Velioglu and Bates methods, respectively. Statistical analysis of the data was performed at $p < ۰,۰۵$using Spss software.

Experimental results showed that the activity of superoxide dismutase, guaiacol peroxidase, phenylalanine ammonia-lyase, polyphenol oxidase and phenolic and proline content under treatment with aluminum increased significantly. The highest antioxidant activity of superoxide dismutase, guaiacol peroxidase, phenylalanine ammonia-lyase, polyphenol oxidase was at the concentration of 10 mM, but the phenolic and proline content at the concentration of 20 mM had the highest activity. In general, the phenolic content and superoxide dismutase enzyme had the highest antioxidant activity among others. The results showed that aluminum increased the proline, phenols and antioxidant activity of saffron crocuses by inducting oxidative stress and producing free radicals.

Keywords: Free Radicals, Guaiacol peroxidase, Heavy Metals, *Phenolic Content*, *Proline*, Oxidative Stress

PP106 Seed morphological study in relation to taxonomy of *Sedum s.l.* (Crassulaceae) in Iran

Maryam Mohammadi Shahrestani[1*], Marziyeh Beygom Faghir[1], Mostafa Assadi[2] *-1. Department of Biology, Faculty of Science, University of Guilan, Rasht, Iran; 2. Research Institute of Forests and Rangelands, Tehran, Iran.*
E-mail: maryammohammadi666@gmail.com

The cosmopolitan genus *sedum* L. comprising ca. 420 species belongs to the family Crassulaceae and subfamily Sedoideae. This genus has a very confused systematic position and it's delimitation has been a matter of controversy. In spite of a number of previous studies, seed characters of the genus were poorly understood. The aime of this study is to represent a detailed account in seed morphology of 22 species of *Sedum s.l.* in Iran using light (LM) and scanning electron microscopy (SEM). The seeds are black, brown or yellow in color and long elliptic to ovate in shape. Their length ranged from 456.8 to 971.7 μm. Three types of seed coat ornamentation (Tenuicostate, Laticostate and Tectocostate) were recognized according to costae thickness and degree of lateral fusion of the papillae. Anticlinal walls are prominent and the shape of periclinal walls varied from concave to weakly convex. Our findings revealed that among the examined characters, seed color and size, total number of costae on both surface of the seed, the width of the space between longitudinal costae, thickness of transverse connections and the shape of periclinal walls were taxonomically usefull in the intergeneric classification and segregation of the genera *Phedimus*, *Hylotelephium* and *Prometheum* from *Sedum s.s*. Our results also support the alliance of two sections *Sedum* and *Epeiteum* due to several identical seed traits existing within these sections. It is suggested to carry out further systematic researches on this large genus such as anatomical, palynological and cytological studies.

Keywords: *Phedimus*, Costae, *Epeiteum*, Periclinal walls

PP107 Assessments of effect of Hydro-Alcoholic extract of *Scrophularia striata* on removing of parasites from raw vegetables

Zoleikhah Mehdizadeh[1], Hamid Darvishnia[1*], Zahra Baghaeifar[1], Shahriar Saeedian[1] *-1. Department of Biology, Payame Noor University, 19395-3697 Tehran, Iran. E-mail: darvishnia_h@yahoo.com*

Scrophularia striata is one of the endemic plants of Iran that used from ancient times until now in Iranian traditional medicine. This study was conducted to evaluate the effects of different concentrations extract of *S. striata* on removing of parasites from raw vegetables in Ilam province. The studied plants were collected from the mountainous regions of Ilam province in the spring of 2020 and were identified and approved. Samples were dried in the shade, the powder was prepared with the help of an electric grinder. The Hydro-Alcoholic leaf and stem extract were prepared by Soxhlet apparatus. Common fresh vegetables were washed in 0/01, 0/1, 1 and 2% concentrations of *S. striata* extract, and with contact time of 15 minutes. After 24 h, remaining washing solution was centrifuged, then the slides were prepared from sediments and were examined under light microscope. Results show that the maximum parasites removing by *S. striata* extract was obtained at 2% concentration. The most removed parasite were Nematode larvae (with 249 parasites), Ascaris with 54 parasites and Entamoeba protozoan with 53 parasites. The minimum removed parasites is related to Trichocephalus and Isospora (each with two parasites). The removal rate of the 2% extract was higher than the other concentrations used. The results of present study showed that the Hydro-Alcoholic extract *of S. striata* can be considered as a natural detergent and cleanser that has a good disinfectant power of edible fruits and vegetables.

Keywords: *Scrophularia striata*, Medicinal Plants, Ilam Province, Soxhlet method, Parasite

PP108 Genetic evaluation of Paradox (a valuable walnut hybrid) resources in Iran based on leaf morphological traits

Melika sadat Tabasi[1*], Masoud Sheidai[1], Darab Hassani[2], Fahimeh Koohdar[1] *-1. Department of Plant Sciences and Biotechnology, Faculty of Life Sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran, 2. Temperate Fruits Research Center, Horticultural Science Research Institute, Agricultural Research, Education and Extension Organizations, Karaj, Iran. E-mail: Malika.tabasi@gmail.com*

Walnut (*Juglans L.*) is one of the most important plant resources for the edible nuts and high-quality wood production. Paradox is a famous rootstock in the walnut industry for fast growth and resistance to some

diseases that raised and described by Luther (1893,1898) in California. The samples of this hybrid collected from California and planted in Kamalshahr research station of the Horticultural Research Department. The genetic background of Paradox that commonly refers to black walnut-Persian walnut hybrid is not generally known. The results of Sue *et al* (2012) study based on nuclear sequences (IGS8-ETS1) indicated that Persian walnut(*Juglans regia*) and six black walnut species, *Juglans hindsii*, *Juglans californica*, *Juglans major*, *Juglans nigra*, *Juglans microcarpa*, *Juglans hirsuta*, are involved in the genetic formation of Paradox hybrids. Leaf morphological traits have a special place in the classification of plants. Based on McGranahan *et al* (1987) study, Paradox hybrids are readily distinguished from their black walnut parents by their leaf morphology, which is intermediate between balck and Persian walnuts. Morphological study and genetic evaluation of valuable sources of paradox seems necessary. In this study, with the aim of genetic evaluation of Paradox resources in Iran, eight leaf morphological features of these specimens including total leaf length, leaflet length, leaflet width, leaflet number, leaflet hairs, leaflet margins, leaflet shape, leaflet bases, in comparsion to Persian walnut (*J. regia*) and black walnut species (section *Rhysocaryon*) have been examined. Based on PCA and PCoA analysis, the Paradox samples are placed in an intermediate position between Persian walnut (*J. regia*) and California black walnut (*J. californica*). Therefore, *J. californica* is the most likely species of black walnuts that is involved in the genetic formation of these specimens. The use of molecular markers can be effective in defining and confirming the genetic background of paradox sources in Iran.

Keywords: Morphological features, Genetic background, Paradox hybrid, Walnut

PP109 Millet potential to tolerate phenanthrene toxicity: Evaluation of the enzymatic and non-enzymatic responses

Sarieh Tarigholizadeh*, Rouhollah Motafakkerazad, Seyed Yahya Salehi Lisar, Elham Mohajel Kazemi -*Department of Plant Sciences, Faculty of Natural Sciences, University of Tabriz, Tabriz, Iran. E-mail: saryeh_tarigholizadeh@tabrizu.ac.ir*

Phenanthrene is a well-known compound belonging to the group of polycyclic aromatic hydrocarbons (PAHs). This compound has three rings with a molecular weight of 178.22 $g.mol^{-1}$ and considers as a low molecular weight PAH. One of the common ways for phenanthrene to enter the human body is to breathe polluted air and eat plants infected with this compound. In fact, plants, as the first link in the food chain, are able to uptake, transport or transform these compounds and play a key role in their remediation. However, little is known about the physiological and biochemical effects of PAHs on plants, and in particular on how plants respond. Therefore, in the present work, the toxic effects of phenanthrene on biochemical responses, including the study of the activity of enzymatic and non-enzymatic antioxidant compounds of *Panicum miliaceum* were studied. For this purpose, the seeds of this plant were hydroponically planted under different concentrations of phenanthrene (0, 500, 1000, 1500, and 2000 ppm) and then the studies were performed. Based on the results of the present study, the activity of antioxidant enzymes increased (catalase, peroxidase, superoxide dismutase and ascorbate peroxidase). At higher concentrations (2000 and 1500 ppm), H_2O_2 content increased despite a decrease in MDA content. Moreover, phenanthrene had no effect on the phenol content of the root and flavonoids of the aerial parts, as well as the protein content of the aerial and root organs (except for the reduction in the protein content of the aerial parts at 2000 ppm). Overall, phenanthrene caused concentration-dependent oxidative stress, meaning that only higher concentrations of phenanthrene caused oxidative stress. In conclusion, phenanthrene is not a very toxic compound to millet, in fact, the antioxidant system of the plant is probably strong enough that even counteract reactive oxygen species production (ROS) in higher concentrations of phenanthrene.

Keywords: Oxidative stress, Antioxidant response, Polycyclic aromatic hydrocarbons, Crop plant

PP110 Effect of mycorrhizal arbuscular fungi in improvement of the growth parameters of *Glcyrrhiza glabra* L. under drought stress

Somayeh Mohammadi[1*], Elaheh Vatankhah[2], Setareh Amanifar[3], Zohreh Toghranegar[2] -*1. M. Sc. Student, Biology Department, Faculty of Sciences, University of Zanjan, Iran, 2. Associate Prof., Biology Department, Faculty of Sciences, University of Zanjan, Iran, 3. Associate Prof., Soil Science Department, Faculty of Agriculture, University of Zanjan, Iran. E-mail: somayehmohammadi@znu.ac.ir*

Drought stress is considered as one of the most serious abiotic stresses that limit plant growth. The symbiotic relationship between arbuscular mycorrhizal (AM) fungi and the roots of higher plants is an important component to cope with water stress. Therefore, an experiment was conducted to evaluate the growth parameters of liquorice affected by inoculation of *Funneliformis mosseae* fungus under different irrigation levels. This experiment was arranged in a factorial completely randomized design with combination of two factors, soil available water (AW) levels (100% AW, 70% AW and 40% AW) and fungi (inoculated with *F. mosseae* and non-inoculated) with four replications. The results showed that drought stress caused a significant decrease in shoot and root fresh and dry weights, shoot and root lengths and leaf relative water content (RWC) while an increase in root fresh and dry weights. The positive effect of inoculation with fungus observed in shoot biomass and length and total plant dry weight that indicates growth promoting effect of *F. mosseae* in shoots. Also, root/shoot dry weights ratio and RWC of inoculated plants were more than non-inoculated plants respectively in moisture levels of 40% AW and 70% AW. Overall, our results showed the application of AM fungi could be critical in the cultivation of medicinal plants under arid and semi-arid conditions.

Keywords: Liquorice, *Funneliformis mosseae*, osmotic stress, biomass, relative water content

PP111 Heavy metals concentration in wheat spike may be related to resistance to Fusarium head blight

Mona Sorahinobar[1,*] -*1. Department of Plant Sciences, Faculty of Biological Sciences, Alzahra University, Tehran, Iran. E-mail: M.sorahinobar@alzahra.ac.ir*

Fungal disease can damage plants and crops, causing major losses in agricultural activities and food production. The aim of this study was to compare the content of 14 elements in the spike of two wheat cultivars with contrasting level of resistance against *F.graminearum*, Falat as susceptible and Sumai3 as resistant. All elements were determined by ICP-MS analysis. According to our results content of Cu and Fe in Sumai3 was higher than Falat. In contrast, in Falat content of P, Zn, K, Ni and Si was significantly higher than Sumai3. The resistant cultivar (Sumai3) had higher content of heavy metals (Cd, Hg, Pb) in spike which may be toxic for pathogen proliferation and spread. Further studies in other wheat cultivars with different levels of resistance to fungal pathogens can help to better understand the mechanism of structural resistance through the accumulation of toxic metals.

Keywords: Falat, Fungal pathogen, ICP-MS, Structural resistance, Sumai3

PP112 Effects of ZnO nanoparticles on germination rate, biomass and protein content of mung bean (*Vigna radiata*) seedlings

Mona Sorahinobar[1], Tooba Deldari[1], Zahra Nazem Bokaee[1,*], Ali Mehdinia[2] -*1. Department of Plant Sciences, Faculty of Biological Sciences, Alzahra University, Tehran, Iran, 2. Department of Marine Science, Iranian National Institute for Oceanography and Atmospheric Science, Tehran, Iran. E-mail: z.nbokaee@alzahra.ac.ir*

Nanoparticles have found novel applications in different branches of sciences including biotechnology and agriculture. This study aimed to examine the effect of ZnO nanoparticles on growth and protein content of mung bean seedlings in vitro. Mung beans seeds were cultured on MS media containing 6 different levels of ZnO nanoparticles (0, 10, 20, 40, 80 and 160 ppm) with three replications. Seedlings were harvested at 7 days after germination and analyzed for germination rate, growth (length and fresh biomass) and total protein content. Results indicated that while an increased length of seedlings were observed at lower concentration of ZnO NPs (0–20 ppm); at higher concentration (40–160 ppm) decrease in length was recorded. Interestingly the seedlings fresh weight significantly decreased with the increase of ZnO NPs concentrations in media culture. ZnO NP treatments also lead to an increase in the mung bean protein

content in all concentrations. Taken together, the inhibition of germination and decrease of seedling biomass can be considered as an indication of stress condition imposed by ZnO. More analysis is underway to clarify the mechanism of ZnO impact on plant nutrition and physiology.

Keywords: Growth, Mung bean, Nanoparticles, Protein content, Seedling, ZnO

PP113 Anatomical studies of Plantago L. leaf in Iran and its taxonomic applications.

Zahra Tavakkoli*, Zahra Ghorbani, Morvarid Bakhshi, Melika Ghasemi -*Department of Plant Biology, Faculty of Biological Sciences, Kharazmi University, Tehran, Iran. E-mail: tavakkoli@khu.ac.ir*

Leaf anatomy of 16 *Plantago* species belonging to nine sections was studied by light microscopy in order to evaluate the most important anatomical features of them and their possible taxonomic implications. The specimens were obtained from FAR and T herbaria or their natural habitats. Basal and lower leaves were fixed in alcohol-glycerin and cross-sections from the middle of leaves were prepared. The samples were stained with methyl blue and carmine and after being mounted in glycerin jelly and photographed by light microscopy. 15 anatomical characters (qualitative and quantative) were selected and measured. The most important characters include main midrib shape, the thickness of epidermis, parenchyma, collenchyma and cuticle; the length of vascular bundles, xylem and pheloem, lamina symmetry, the number of lateral vascular bundles. Our results show that leaf anatomical features provide reliable evidenced for the sections and species taxonomically valuable.

Keywords: Plantaginaceae, anatomy, Taxonomy, Iran

PP114 Pollen and Anther Development in *Lycium ruthenicum* (Solanaceae)

Mohammad Doostali[1*], Fatemeh Mahmoodi Kordi[2], Mahsa Aminsalehi[1] -*1. Department of Biology, Faculty of Sciences, Bu-Ali Sina University, Hamedan, Iran, 2. Department of Biology, Faculty of Sciences, Shahid Madani Azarbaijan University, Tabriz, Iran. E-mail: M.doostali@sci.basu.ac.ir*

Lycium ruthenicum is a nutritional food, and is a native medicinal plant of Iran. It has widely been used for treatment of different diseases in traditional Chinese medicine. There is not any report about detailed embryological features of *L. ruthenicum*. The goal of this study was to investigate the microsporogenesis, and microgametogenesis in detail, in this plant. The young flowers and buds were removed in various developmental phases, fixed in FAA and kept in 70% ethanol. Specimens were embedded in paraffin and sectioned using microtome. Staining was carried out with Hematoxylin-Eosine. Results showed that the anther is tetrasporangiate. The cytokinesis is simultaneous. The tapetum is of the secretory type and the microspore tetrads are tetrahedral. The tapetum is binucleate in most parts, but uninucleate in some. The pattern of wall formation is basic type. The endothecium becomes fibrous in mature anthers .The pollen grains are two-celled when shed and the anther dehiscence is Entrose. The mature pollen grains are spherical and tricolporate with gemmate decorations. The maturation of pollen grains is synchronous in adjacent pollen sacs.

Keywords: Microsporogenesis, Microgametogenesis, Microspore, Tapetum

PP116 Phytochemical screening of wild-growing populations of *Salvia leriifolia* Benth. based on phenolic acid profiles

Nafiseh Nematshahi[1], Parvaneh Abrishamchi[*1], Tayebeh Radjabian[2], Seyed Alireza Salami[3] -*1. Department of Biology, Faculty of Sciences, Ferdowsi University of Mashhad, Mashhad, Iran, 2. Department of Biology, Faculty of Basic Sciences, Shahed University, Tehran, Iran, 3. Department of Horticulture, Faculty of Agriculture and Natural Resources, University of Tehran, Tehran, Iran. E-mail: abrisham@um.ac.ir*

Phenolic acids are a large group of natural plant substances that according to the wide range of beneficial biological properties have many applications in the pharmaceutical and food industries. The presence of these compounds has been reported in various species of the *Salvia* genus. Since the quantity and quality of phenolic compounds can be affected by different factors such as genetics and climatic and geographical conditions of the habitat, the study of phenolic acid profile in species and plant populations make it easier to get the best natural resources of these compounds. The present study screened eleven populations of *Salvia leriifolia* Benth. for the content of total phenolics, rosmarinic acid (RA), lithospermic acid (LA), and

salvianolic acid A and B (Sal A, Sal B). Plant samples were collected from Razavi and South Khorasan provinces and Semnan province. Total phenolic content and phenolic acids were analyzed by spectrophotometry and HPLC methods, respectively. Leaves were main sources of phenolic acids especially RA and Sal B, compared to the roots. The greatest amount of RA and LA in leaves were belonged to Shirahmad population and in roots, was obtained in Helali and Sarogh populations. The leaves of Baghejar and Damanjan populations had the highest values of Sal A and Sal B, respectively while, the maximum amount of these two compounds in root was found in Baghejar population. The highest level of total phenolics was observed in the leaves and roots of Torbat and Helali population, respectively. In conclusion, since among the eleven populations, Shirahmad, Helali, Sarogh, Baghejar, Torbat and Damanjan populations possessed a high potential for production and storage of phenolic acids, they can be introduced as dominant populations for medicinal or industrial purposes. So, application of biotechnology to improve phenolic acid production in these selected populations is recommended for the future investigations.

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

PP117 Melatonin-mediated regulation of antioxidant defense system and nutritional balance on cannabis seedlings under overloads of copper and zinc condition

Hakimeh Oloumi[1*], Ali Zamani[1], Hossein Mozaffari[1], Mohammad Javad Arvin[1,2]-*1. Department of Ecology, Institute of Science and High Technology and Environmental Sciences, Graduate University of Advanced Technology, Kerman, Iran. E-mail: oloumi.ha@gmail.com*

The interactive effects of exogenous melatonin and toxic amounts of zinc and copper were studied on growth parameters, and nutritional balance of cannabis seedlings. Seeds were planted in a completely randomized design with three replicas, were irrigated every other day with complete Hoagland's nutrient solution. Three weeks after seeds germination, 3 levels of $CuSO_4$ (0, 50 and 150µM), $ZnSO_4$ (0, 50 and 100µM) and their interactions were supplied for 2 weeks on irrigated solution. During the second week of metal treatments, melatonin added into nutrient solution at two levels of zero or 50µm. Growth parameters, and mineral nutrition were studied after harvest. Overloads of Zn and Cu led to reduced growth parameters and imbalance of minerals nutrients in cannabis seedlings. However, melatonin 50µM alleviated the growth retardation of seedlings under normal condition and heavy metal stress. Ion homeostasis was considerably regulated by melatonin in seedlings under heavy metal stress, as well. Our results support the idea that melatonin, in addition to acting as a powerful antioxidant, it also can be considered as a potent regulator in ion homeostasis of cannabis seedlings under heavy metal toxicity. However, there is still lack of information about the precise mechanism of melatonin action on nutritional balance in plants.

Keywords: Cannabis, Growth parameters, Heavy metals, Melatonin, Nutritional elements

PP118 Effect of culture medium on *in vitro* culture of Damask rose (*Rosa damascena Mill*.)

Sanaz Hemmati Asl[*1], Ebrahim Dorani[2] -*1. Msc student, Plant Biotechnology Department,University of Tabriz Iran, 2. Associate professor, Agricultural Biotechnology Research Institute of Iran, Tabriz. E-mail: sanaz_hemmati@yahoo.com*

Damask rose belongs to the genus Rosa and belongs to the Rosaceae family, which is one of the most important aromatic species with medicinal properties and therapeutic effects .Propagation of damask rose using conventional asexual propagation methods such as cuttings and cuttings is difficult due to the difficulty of filling the ectopic roots and its time consuming. The use of tissue culture and micropropagation techniques is an alternative method for propagation of better damask rose genotypes. In this study, in order to investigate the effect of culture medium on *in vitro* propagation of damask rose, two different culture media MS and WPM supplemented with 0.5 mg / l BAP and 0.1 mg / l TDZ were tested. The results of cultures showed that on shoot proliferation, MS culture medium is better to WPM, which can be attributed to the higher ionic strength of MS culture medium than WPM.

Keywords: Tissue culture, shoot propagation, explant

PP119 Effect of explant size and culture medium on meristem culture of strawberry (*Fragaria ananassa*)

Sanaz Hemmati Asl[*1], Ebrahim Dorani[2] -*1*. *Msc student, Plant Biotechnology Department,University of Tabriz Iran, 2. Associate professor, Agricultural Biotechnology Research Institute of Iran, Tabriz. E-mail: sanaz_hemmati@yahoo.com*

Nowadays, plant tissue culture is used as a useful tool for induction a new genetic variation to crops breeding as well as to produce disease-free plants. Meristem culture is one of the most important ways of producing virus-free plants. Given the importance of strawberry production and viral diseases damage in plant production, it is necessary to implement proper management strategy in the production of virus-free plant materials. This study was carried out in the plant biotechnology laboratory of Tabriz University with the aim of optimizing the meristem culture of strawberry (*Fragaria ananassa*) CV,Gavita and investigating the factors affecting it. In the first experiment to investigate the effect of meristematic dome size on meristem culture, three different explant including meristematic dome, meristematic dome with one primordial leave and meristematic dome with two primordial leaves separated and in cultured in MS supplemented with 1 mg/l BAP and 0.2 mg/l IAA. The second experiment was conducted to investigate the effect of liquid, semi-solid and solid MS medium on meristem regeneration. All mediums supplemented with 1 mg/l BAP and 0.2 mg/l IAA. All experiments were performed in a completely randomized design with five replications. Traits evaluated included percentage of survived meristem, number of regenerated shoots, and length of shoots. The results showed that there was a significant difference between the meristem dome size and the number and length of shoots obtained from meristem.The best results obtained with the meristematic dome with two leaves. Results showed that there was a significant difference between mediums in meristem induction and the best result obtained from semi-solid medium where all meristems were regenerated and produced more shoots with highest length.

Keywords: Gavita, meristematic dome, virus, MS

PP120..A study of species diversity of *Sarconema Zanardini*, 1858 (red algae) in the southern coast of Iran

Sana Tarahideh[1], Saeed Afsharzadeh[1*], Shabnam Abbasi[1] -*1*. *Department of Plant and Animal Biology, Faculty of Biological Science and Technology, University of Isfahan. E-mail: s.afshar@sci.ui.ac.ir*

The marine alga genus *Sarconema Zanardini* (1858) is from family Solieriaceae, order Gigartinales belongs to the phylum Rhodophyta (red algae). This genus is economically important such as agar reproduction and application in the pharmaceutical and medical industries. This alga is found in tropical and subtropical area of Indian Ocean and south Pacific on the intertidal rocks and coralline stones, and one of its species is restricted to China, the western part the north Pacific. According to database of algae (Algaebase) three species for this genus have been accepted taxonomically. One species of this genus (*Sarconema filiforme*) has been introduced for algal flora of the south coasts of Iran, that identification of this species has been based on morphological characters and not based on anatomical characters. In order to study of this genus based on anatomical and morphological characters, samples were collected in several stations of Persian Gulf seashores from spring 2015 to autumn 2016. All samples were identified as *S. filiforme*. Based on cluster analysis of morphological and anatomical characters, the specimens of this species were groupted in three distinct categories that showing interaspecies variation in *Sarconema filiforme*. So, sometimes that may be interfered with species of genus closet to it, such as *Solieria*. DNA extraction was done with different method from various specimens of this species, but wasn't obtained good quality of DNA for molecular studies. Molecular study via molecular markers is necessary for exact delimitation of this species. Therefore, more studies are necessary for pure DNA extraction from specimens of this species.

Keywords: *Sarconema*, Morphology, Anatomy, Cluster analysis, Persian Gulf

PP121 Evaluation of effective parameters on menthol extraction from Semnan native peppermint plant using Hydro-distillation method

Meade Azadbakhsh[1], Maryam Khajenoori[2*], Bahman Zarenejad[3]- *1. M.S. Student, Faculty of Chemical, Petroleum and Gas Engineering, Semnan University, Semnan, Iran, 2. Faculty of Chemical, Petroleum and Gas Engineering, Semnan University, Semnan, Iran, 3. Faculty of Chemical, Petroleum and Gas Engineering, Semnan University, Semnan, Iran. E-mail: m_khajenoori@semnan.ac.ir*

One of the most famous sources of medicinal plants containing essential oils (EOs) is the peppermint plant, which belongs to the Lamiaceae family. Due to having more menthol than all branches of the Lamiaceae family, it has received more attention. Peppermint plant has many properties such as: antimicrobial, antiviral, antioxidant, anti-cancer, anticoagulant and anti-allergy and is widely used in various medical, pharmaceutical, food, cosmetic and perfumery industries .in this study, from Semnan native peppermint plant for extraction of more menthol according to the parameters affecting the extraction such as solid to solvent ratio (grams of dry sample / amount of solvent in ml) equal to 1:10, 1:15 and 1: 20, thermal power (kW) 6, 8 and 10 and average particle size (mm) 0.5, 0.75 and 1 have been investigated. The EOs was extracted from the peppermint plant by the most common method of industrial distillation, Hydro-distillation. The advantage of using this method is simplicity in setting up and not using solvent. GC and GC-MS have been used to identify the EOs compounds. Peppermint was prepared from Hassan-Abad area, located 5 km southwest of Semnan in June 2019. Samples were stored in high density polyethylene bags after 5 days of drying at 30 to 40 ° C. Crush 50 g of the dried sample to the desired size and mix it with deionized distilled water and 5 g of boiling stone and after placing it in the balloon of the Clevenger device, the test is performed. The results showed that in the ratio of solid to solvent 0.05 g / ml, heat capacity of 9 kW and average particle size of 0.5 mm, the amount of EOs production was 15.8494%. The six main constituents of peppermint EOs are 44.60% menthol, 21.92% menthone 6.27% isomenthone, 4.37% (E)-Caryophllene, 3.79% Germacrene-D and 3.70% of 1,8-Cineole.

Keywords: Medicinal Plants, Essential Oils (EOs), Clevenger, GC, GC-MS

PP122 Optimization of pectin production from Carrots, Apples and Orange peel

Javad Karimi[1], Hossein Pasalari[2] *-1. Department of Biology, Shiraz University, Shiraz 71454, Iran, 2. Department of Agriculture Engineering, Minab Higher Education Center, University of Hormozgan, Bandar Abbas, Iran. E-mail: jkandeani@gmail.com*

Pectin is one of the main sugar components of plant cell wall, which is widely used in food, pharmaceutical and cosmetic industries. In industrial scale, pectin is produced mostly from citrus peels. Pectin in combination with water and some other substances acts as a thickener, gel-forming agent, stabilizer and cation-binding agent. The aim of this study was to optimize pectin production from carrots, apples and orange peel using citric acid, acetic acid and hydrochloric acid at different temperatures of 60 to 90°C. First, carrots, apples and orange peels were washed and finely grated, then 10 g of grated fruits reached to certain volume with distilled water, and then certain amounts of each of the mentioned acids (250 ml) separately were added and heated at different temperatures. By adding of absolute ethanol (96°), the pectin was made into a jelly and separated with filter paper. Finally, it was dried at 40 ° C for 24 hours. The results of different experiments with three replications showed that the highest amount of pectin was obtained from apples, orange peel and carrots, respectively. Although the difference between apples and orange peel was not significant, but pectin production from carrots was significantly lower than the others. The best conditions for optimal pectin production were the use of hydrochloric acid and the highest temperature (90°C). Using fruit waste to produce pectin in this simple way can be a good economic justification.

Keywords: Isolation of Pectin, Optimization, Fruit peel, Temperature

PP123 Evaluation of plant lepidium peroxidase enzyme stability at different PH

Seyedeh Maryam Hosseini[1] , Ali Riahi-Madvar[2*], Mojtaba Mortazavi[1], Safa Lotfi[1] *-1. Department of Biotechnology, Institute of Science and High technology and Environmental Sciences, Graduate University of Advanced Technology, Kerman, Iran; 2.*

Department of Molecular and Cell Biology, Faculty of Basic Sciences, Kosar University of Bojnord, Bojnord, Iran. E-mail: riahi.ali@gmail.com

Peroxidases (EC 1.11.1.7) are oxidoreductases that catalyze the reduction of peroxides such as hydrogen peroxide (H_2O_2) and the oxidation of a variety of organic and inorganic compounds. Most commercial applications of peroxides are in analytical diagnostics such as biosensors and immunoassay. In this study, the main purpose was to evaluate the stability of plant *Lepidium draba* peroxidase (LDP) at different pH ranges. In this study, after culturing bacteria containing pET28a vector, which carries the plant peroxidase gene LDP, using IPTG inducer, expression was increased for 4 hours at 18 °C. Protein purification was performed using Ni-NTA affinity chromatography column, and using imidazole-containing buffer. Protein purity was determained by SDS-PAGE gel electrophoresis and its concentration was measured by Bradford method and its activity was measured in the presence of TMB and H_2O_2 substrates at 653 nm using a spectrophotometer. Then enzyme activity was measured at different pH (5-9) with three repetitions. The results of gel electrophoresis showed that the protein was purified with high purity and has the highest activity in the pH ranges of 6 to 6/5 which decreased its activity at other acidic PHs as well as neutral and basic condition. So, it suggested, for applied this enzyme under others pH conditions, use mutagenesis and/or other methods to increase its pH stability.

Keywords: Electrophoresis, Oxidoreductase, Purification

PP124 Effects of cold stress on biochemical and physiological characteristics of *Antirrhinum majus*

Zohreh Nasiryan jazi[1*], Behrouz Salehi[2], Fatemeh Daneshmand[3], Amirabbas Minaie far[4] -*1. Master, s degree student in Biochemistry, PayameNoor University, Taft, Iran, 2,3,4. Departent of Bilogy, PayameNoor University, Tehran, Iran. E-mail: zohrehnasir57@gmail.com*

Antirrhinum majus, a biennial or perennial herbaceous plant that can survive to at low temperatures. This paper aims to investigate the biochemical and physiological responses of this plant to cold stress. Thus, the experiment was performed in a completely randomized design with 3 treatments and 4 replications. The *Antirrhinum majus* pots were placed in three treatment groups for -10°C, 3°C and 23°C for 3 weeks. Then stem length, dry and wet weight of aerial parts, chlorophyll a and b, carotenoids, anthocyanins, phenolic compounds, compatible osmolytes including soluble carbohydrates, proline and betaine glycine, protein, malondialdehyde and so on. Catalase (CAT), gayacol peroxidase (GPX) and ascorbate peroxidase (APX) enzymes were measured in plant leaves. The results showed that cold stress -10°C increased altitude, wetter weight, amount of carotenoids, proline, soluble carbohydrates, phenolic compounds, anthocyanins and the activity of the enzyme ascorbate peroxidase. However, the amount of chlorophyll a, malondialdehyde, protein and the activity of catalase and gayacol peroxidase enzymes did not change compared to control plants at 23°C. The results of this study showed that the *Antirrhinum majus* plant prevents the damage caused by cold stress by increasing the amount of compatible osmolytes and non-enzymatic antioxidants and some enzymatic antioxidants.

Keywords: Antioxidant enzymes, Osmolyte, Photosynthetic pigments

PP125 The micromorphological investigation of pollen grains of *Hedera* L. (Araliaceae)

Fahimeh Fallah* - *Department of Biology, Faculty of Sciences, Razi University, Kermanshah. E-mail: f.falah1221@gmail.com*

The palynomorphological characteristics of 5 species belonging to *Hedera* of the Araliaceae family were studied in detail. These plant species were collected from various phytogeographical regions of Iran and Central Europe. The palynological investigation was accomplished using Transmission Electron Microscope (TEM) and Scanning Electron Microscope (SEM). Pollen grains of the species are reticulate, prolate, sub-prolate, tricolporate, isopolar, radially symmetrical, and monad. The largest pollen grain was in the *Hedera colchica* species (60.99±2.8 μm) and the smallest pollen grain was in *Hedera helix* (28.63±2.1 μm). The research carried out by the TEM showed that the species were different in terms of Exin thickness,Tectum thickness, Foot layer thickness, the diameter and length of the Columellae, the thickness and shape of the Caput, the tectum to footl ayer ratio (T/F), the absence or presence of the Endexine and the

thickness of the Intine layers. Observed differences were not of diagnostic importance in species level. The main aim of this study was to find distinguish pollen characters in the species of the genus *Hedera* and to elucidate their systematics importance

Keywords: Systematics, TEM, Iran, SEM, Eexin

PP126 Positive effects of cerium oxide nanoparticles on growth and biochemical parameters of Moldavian balm under salinity stress

Mona Hasan Zadeh Mohammadi[1], Anahita Navai[1] , Gholamreza Gohari[2*] -*1. Department of Biology, Faculty of Sciences, University of Maragheh, Maragheh, Iran, 2. Department of Horticultural Sciences, Faculty of Agriculture, University of Maragheh, Maragheh, Iran. Email: hassanzadehmona@gmail.com*

Salinity is one of the most common abiotic stresses with negative impacts on soils and plants. Substantial disorders in morphologic and physiologic characterizations of plants including decrease in shoots and leaves growth, photosynthetic pigments and membrane permeability could be an important salinity effect. Over recent years, application of engineered nanoparticles (NPs) has been increased to lessen the impacts of salinity stress in modern agriculture. The current study aimed to evaluate the effects of synthesized cerium oxide NPs (CeO_2 NPs) (at 25, 50 and 100 mg L^{-1} concentrations) under salinity stress conditions (50 and 100 mM NaCl) on Moldavian balm (*Dracocephalum moldavica* L.). A complexly randomized design (CRD) was used with three replications. Salinity stress was daily imposed until the harvest, three weeks later to imposing salinity, four levels of CeO2 NPs (8-15 nm) were applied through foliar spraying over aerial parts, then, physiological and morphological traits were measured. Salinity decreased agronomic traits such as leaves and shoots fresh and dry weights, chl *a*, *b* and carotenoid and SPAD and increased MDA, H_2O_2, EL, Pro, antioxidant enzyme activities (SOD, APX and GP). Besides positive effect of CeO_2 NPs under non-stress condition, CeO_2 NPs application decreased the negative impacts of salinity through significant increase in agronomic traits, photosynthetic pigments, SPAD, Pro, antioxidant enzymes. In addition, CeO_2 NPs decreased MDA, H_2O_2 and EL under salinity condition. 50 mg L^{-1} concentration of CeO_2 NPs could be considered as the best treatment under both non-stress and salt-stress conditions. In conclusion, CeO_2 NPs treatments on Moldavian balm improved the plant performance under salinity and could be considered as a promising treatment to alleviate salt stress condition.

Key words: Lamiaceae, abiotic stress, nanotechnology, secondary metabolite

PP127 Seed priming of Roselle in related to improve seedling characteristics

Ahmadizadeh Mostafa[1], Pasalari Hossein[1*], Asgari Ashkan[1] -*1. Assistant Professor of Department of Agriculture, Minab Higher Education Center, University of Hormozgan, Bandar Abbas, Iran. E-mail: hossein.pasalari@Hormozgan.ac.ir*

One of the most common strategies that researchers suggest for improving and uniformity of germination, recovery and speed of emergence and plant establishment is seed priming. The present study was been conducted in order to use seed preparation technology to increase resistance to environmental stresses and to investigate the effect of seed hydropriming and osmopriming on germination indices and seedling growth of Roselle. Eexperiment based on a completely randomized design with 3 replicates were conducted at agriculture laboratory of Minab Higher Education Center, University of Hormozgan in 2020. In this experiment, the effect of different pretreatments were evaluated on germination indices of roselle. These pretreatments were the use of distilled water (0, 12 and 24 hours), potassium nitrate (0.5 and 1% for 12 and 24 hours), sodium sulfite (0.5 and 1% for 12 and 24 hours), potassium chloride (1 and 2% for 12 and 24 hours) and calcium carbonate (1 and 2% for 12 and 24 hours. Numbers of germinated seeds in each petri-dish were counted and recorded once every 24 hours and germination indices were measured at the end of the The thirteenth day which germination was fixed. Germination indices and seedling growth traits of Roselle including, germination percentage, median time of germination, coefficient velocity of germination, radicle and shoot length, leaf and root fresh weight and leaf and shoot dry weight was evaluated and measured. The analysis of variance revealed significant ($P < 0.01$ and $P < 0.05$) differences in most of the studied traits. Application of different pretreatments increased the germination indices of Roselle. The results showed that, pretreatment with calcium carbonate 2% for 24 hours could induce the

highest indices of germination and seedling growth traits in Roselle. Significant correlation conducted between coefficient velocity of germination, radicle length and median time of germination.
Keywords: Medicinal plant, Hydropriming, Osmopriming, Germination indices, Seedling establishment

PP128 Salt stress mediated changes in growth of ajwain (Trachyspermum copticum)

Atiyeh Daryabeigi[1], Faezehossadat Abtahi[1]* , Hossein Salehi-Arjmand[1] -*1. Department of Medicinal Plants, Faculty of Agriculture and Environment, Arak University, Arak 38156-8-8349, Iran. E-mail: f-abtahi@araku.ac.ir*

Salt stress tolerance in plants is induced by changes in molecular responses accompanied with alterations in the plant transcriptome, metabolome and proteome. Screening accessions for salt tolerance may be a rapid method of identifying which are most likely to survive when planted at salinized areas. To investigate the effects of salt stress on some accessions of *Trachyspermum copticum*, an experiment was conducted as factorial based on completely randomized design with three replications in the greenhouse. Studied factors included salt stress (0 and 100 mMol of NaCl) and ten accessions of ajwain (Shiraz, Esfahan, Hamadan, Zahedan, Tabriz, Mashhad1, Mashhad2, Yazd, Ahwaz and Arak). Based on the results, salt stress had decreasing effect on some morphological traits including main stem height, total fresh weight and total dry weight, 11.73, 44.66, 28.31 percent in comparison to control, respectively. There was a significant difference between the accessions in the measured traits, so that in the control, the highest main stem height was related to accessions of Hamedan (78.12 cm), the highest total fresh weight (22.84 gr) and the highest total dry weight (1.60 gr) related to accessions of Mashhad 1, also in 100 mMol of NaCl, the highest main stem height was related to accessions of Ahvaz (63.96 cm), the highest total fresh weight (8.16 gr) and the highest total dry weight (1.08 gr) were related to accession of Zahedan. It could be concluded that the salinity threshold for ten accessions, at which a considerable decrease in relative morphological traits per unit of salt, is more than 100 mM. Thus, identifying the physiological mechanisms and adjustments in ajwain under salinity as well as the threshold water potential at which physiological dysfunction begins to occur, would provide an understanding and help in developing adaptation strategies to protect this crop in the event of unexpected salinity.
Keywords: Salt sensitive species, Morphological traits, Screening accessions

PP129 Structural studies of medicinal plant of *Alyssum minus*, Endemic to Iran

Fatemeh Rabizadeh[1*], Pegah Eskandarpour [1] -*1. Department of Biology, Women's University of Semnan (Farzanegan), Semnan, Iran. E-mail: Rabizadeh@fgusem.ac.ir*

One of the largest genera of the Brasicaceae family is the genus Alyssum with 195 species. Iran is a genetic origin of the genus Alyssum, in which four endemic species of A. lepidotum, A. homolocarpum, A. minus, and A. maritimum grow in Iran. The habitat of Alyssum is mostly desert, hot and dry areas of Semnan province and Shiraz province. In traditional medicine, this plant is known as local Qodomeh (A. minus) whose habitat is Semnan province and Shirazi Qodomeh (A. homolocarpum) whose habitat is Fars province. The seeds of the local Qadoomeh plant are often darker than the seeds of Shirazi Qadoomeh and are almost brown. Systematic and morphological characteristics and environmental effects of A. minus were investigated in this article. The vegetative form of this annual herbaceous species has simple and alternate leaves. It has a cluster of bisexual flowers with an upper ovary. A. minus species has small leaves and all parts of the plant are covered with star-shaped hairs. The healing properties of this plant in the treatment of rabies, pain relief, reduction in sputum, reduction of mastitis and earache and its seed mucilage is usually used in the form of soaking in water, which has long been considered by the ethnobotanians of Semnan. Various chemical compounds were found in A. minus species, the most important of which are Sesquiterpene, monoterpenes, aldehydes and fatty acids. Anatomical sections of various organs of this plant and thus numerous crystals formed due to the absorption of heavy minerals such as Nickel element in the organs of stems, leaves and roots and also many cystolites were observed in the epidermal cells of A. minus.
Keywords: Systematic, Medicinal Properties, Semnan, Hairs, Nickel

PP130 Determination of Antioxidant Capacity of *Haplophyllum canaliculatum* in Different Habitats of Larestan Region (Fars Province, Iran)

Alieh Sadat Rafaat Haghighi [1*], Mokhtar Heidari[2] *-1. Post Graduate student of Horticulture; College of Agricultural and Natural Resources, University of Hormozgan, Banda Abbas, Iran. 2. Associate Professor, Department of Horticulture Agricultural and Natural Resources University of Khuzestan, Mollasani, Iran. E-mail: rafaat haghighi@yahoo.com*

The genus Haplophyllum (Haplophyllum) belongs to the family Rutaceae, has 70 species around the world, of which 30 species grow in Iran and these species are more widespread in the southeastern regions of Iran, Haplophyllum canaliculatum Boiss., Diagn.I,) is one of the species of the genus Haplophyllum Haplophyllum, which grows only in Iran and its most important habitats are in the south of Iran, especially in Fars and Hormozgan provinces. This plant is used alone or in combination with other plants in traditional medicine. Due to the fact that limited studies have been done in the field of separation and constituents of wicker plant. In the present experiment, using DDPH and gallic acid as a reference antioxidant, the antioxidant capacity of eleven plant samples collected from four different habitats in Larestan region (southeast of Fars province, Iran) including the 'Nime' region (center of Larestan), 'Dehkuyeh' region (North of Larestan), 'Pardi Mountain' (south of Larestan) and 'Dorz va Saiban' (North-east of Larestan) were studied. The results showed that the mean inhibitory capacity in the collected samples was 79.09 + 4.84 (IC50 mg / ml), the maximum was 92.05 in sample No.5 of the 'Nime' region (center of Larestan) and the minimum was 68.81 related to sample No.1 'Dehkuyeh' region (North of Larestan). The results showed that environmental conditions in Larestan region had an effect on the antioxidant capacity of the Haplophyllum plant and indicate the existence of differences in biochemical compounds related to antioxidants in this plant. It is suggested that more studies be conducted on the effect of environmental conditions on antioxidant properties and biochemical compounds of Haplophyllum in its different habitats in Fars province.

Keywords: Antioxidant, Temperatures, Phenolic compounds, Haplophyllum

PP132 Effect of Fe_3o_4 Nanoparticles in Cadmium Stress Reduction of Tomato

Razieh Rahmatizadeh[*1], Mohammad Javad Arvin[2] , Ahad Ebne abdolalli[3] *-1. Biology Department, Faculty of Science, Urmia University, Urmia, Iran; 2. Horticulture Department, Faculty of Agriculture, Kerman, Iran; 3. Horticulture Department, Faculty of Agriculture, Urmia University, Urmia, Iran. E-mail: Razieh_rahmaty@yahoo.com*

Nanotechnology has applications in all aspects of modern life, especially agriculture. The role of iron in reducing non-biological stresses has not been widely evaluated despite the fact that it is considered an essential element for plant growth. Therefore, in this study, it was attempted to assess the impact of five concentrations of Fe_3o_4 magnetic nanoparticles (0, 10, 20, 50 and 100 mg/L) as well as three $CdCl_2$ concentrations (0, 100 and 200 µM) on tomato plant. Cadmium decreased growth and photosynthesis parameters and increased the content of MDA, H_2O_2 and proline in tomato; however, 20 mg/L concentration of Fe_3O_4 nanoparticles improved cadmium toxicity. Overall, 20 mg/L concentration of Fe_3O_4 nanoparticles is potentially advantageous for plant growth and may stimulate various defense mechanisms of plants in response to cadmium.

Keywords: Nanotechnology, Oxidative Stress, Stress Responses, Heavy Metal, Environmental Stress

PP133 Introduction of some species of Malvaceae from Logar Province,Afghanistan

Mohammad Hanif Rasikh[*], Marzieh Beygom Faghir, Asghar Zamani *-Department of Biology, Faculty of Science, University of Guilan, Rasht, Iran. E-mail: hanifrasikh@yahoo.com*

Afghanistan is a very mountainous country, with an area of 652,089 square kilometers and a very dry climate. Afghanistan is rich in biodiversity, especially plant species. About 5000 plant taxa have been introduced until now. However, only a few studies have been conducted on the flora of Afghanistan. Logar province with about area of 3880 square kilometers is located in the east of Afghanistan, with geographical coordinates 33°56′21″N, 68°55′24″E. The average elevation of the province is 1953 meters above sea mean level. Logar is surrounded by Kabul from north, by Paktia from south, by Nangarhar from east and by Maidan Wardak and Ghazni from west. The study area is located in southeast Kabul, vicinity of Barki-Rajan village. As a part of the master's thesis, about 100 samples were collected from this region. Plant

specimens were photographed in the field, then dried and transferred to the herbarium of the University of Guilan. For identification of the samples, some slides of several parts of the plants were provided. The characters were evaluated using the relevant sources. For detailed studies, some photos were provided using a stereomicroscope and a Samsung Galaxy smartphone. Among the collected samples, the identified species of the Malvaceae family, including *Abutilon theophrasti*, *Alcea rhyticarpa*, *Althaea armeniaca*, *Hibiscus trionum*, *Malva neglecta* and *M. sylvestris* are introduced in this survey. All of these species occur in the flora of Iran territory.

Keywords: Climate, Flora, Identification, Mountainous, Vegetation

PP134 Evaluation of changes in physiological parameters related to the lifespan of cut gerbera flowers under ascorbic acid and iron nano particle

Razieh Rafiei, Seyedeh Batool Hassani, Mohammad Reza Ghalambaran - *Faculty of Life Sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran. E.mail: m_ghalamboran@sbu.ac.ir*

Gerbera (*Gerbera jamesonii* Bolus ex Hooker f.) is a perennial plant belonging to the Astraceae that is widely cultivated in most parts of the world. The area under gerbera cultivation in the world is 1100 to 1200 hectares and in Iran is 6 hectares. Gerbera flower is one of the ten most important cut flowers in Iran and the world. In this study, the effect of ascorbic acid concentration (0, 0.5 and 1)g/l on d and ascorbice iron nanoparticle at the concentration of 1% elaying the aging of white and Red gerbera cut flowers was investigated. The results showed that the application of 1g/l ascorbic acid caused the greatest delay in the aging of cut flowers compared to the control (distilled water). Which is treated as a solution in sterilized bottles . The fresh weight and diameter of flowers treated with 1g/l ascorbic acid and ascorbic acid iron nanoparticles were higher than other treatments. The results of antioxidant enzymes (catalase and superoxide dismutase) and malondialdehyde in cut flowers of Gerbera during 9 days and 13 days for ascorbic acid nanoparticle showed that the activity of catalase increased in cut flowers treated with ascorbic acid and ascorbic acid nanoparticle. The activity of superoxide dismutase gradually decreased with aging of cut flowers stored in distilled water, while the use of 1g/l ascorbic acid and ascorbic acid nanoparticle prevented its reduction. The use of 1g/l ascorbic acid also delayed the aging of cut flowers by preventing the increase of malondialdehyde. Therefore, storage of cut flowers of white and Red gerbera in 1g/l ascorbic acid and ascorbic acid nanoparticle solution delayed the aging of flowers.

Keywords: Ascorbic acid, Gerbera, Superoxide dismutase, Catalase, Malondialdehyde, nanoparticle iron ascorbic acid

PP135 Ethnobotanical study of medicinal plants used in Eqlid (Fars Province)

Shabnam Abbasi[1], Mozhgan Habibi[2*] -*1. Biology Lecturer of Farhangian University, Shahid Rajaee Higher Education Center, Isfahan, Iran, 2. Biology Teacher Student of Farhangian University, Shahid Rajaee Higher Education Center, Isfahan, Iran. E-mail: mozhganhabibi77@gmail.com*

From past to present, plants especially medicinal plants have played an important role in many things including drug producing and disease treatment. Eqlid city is a mountainous region has been located in the south of Iran (the northwest of Fars Province). Due to the diverse climatic conditions of this city, medicinal plants used for use in modern medicine have been studied. Specimens of medicinal plants of Eqlid city were collected during three seasons of spring, summer and autumn in 2019-2020. Specimens were identified using credit resources such as Persian Flora books of Iran and Flora Iranica. Then, questionnaires including information about age and literacy of indigenous urban and rural people, scientific and local name of the used plant, type of used plant organs, medicinal properties of these plants and consumption instruction by people were prepared and were completed by natives of central part of Eqlid. In this study, 133 medicinal plant species belonging to 38 families and 106 genera were identified. Astraceae had the most distribution in the region. *Descurainia Sophia* (L.) Webb ex Prantl and *Carum carvi* L. had the highest and lowest application, respectively. The highest use of medicinal plants used by Eqlid people has been effective in treating gastrointestinal disorders, urinary-genital disorders, pain treatment and respiratory disorders, respectively. The most widely consumed organs of these plants are leaves and the most widely used instruction of them is decoction. Regarding to the results of this study, medicinal plants of Eqlid city

could be important for obtaining reasonable herbal medicines. Iran has the ability to expand ethnobotanical studies and the use of medicinal plants for medical science due to the diverse geographical conditions and rich vegetation.

Keywords: Medicinal Plants, Vegetation, Medicinal properties, Consumption instruction, Zagros Mountains

PP136 Study of Chromosome number in wetland plants

Hamideh Javadi[1*], Adel Jalili[1] -*1. Research Institute of Forests and Rangelands, Tehran, Iran. E-mail: Hjavadim@yahoo.com*

Wetlands are hollows of lowland areas that are formed as a result of moisture accumulation and play a very important role in biodiversity of species richness, especially medicinal and forage species. Cytogenetics of wetland plants is one of the tools for recognizing the effect of ecological factors and adaptation of plants to changing environmental and climatic conditions. Because cytogenetic study of populations in different regions can show changes in ploidy level and its relationship or lack of relationship with ecological factors. In this survey, metaphases plates of ten populations of sex species were perpetrated from tip of root by squash method and using an Olympus microscope (BX41 Olympus supplemented Digital color video camera) at a magnification of about 2000x. The Results showed that in populations we have three basic chromosome numbers (X=6,7 & 9), *Lilium arundinaceum*, *Ononis spinose, Trifolium pratence*, with 2n=14, *Plantago lanceolate* with 2n=12, *and Arctium lappa*, with 2n=18 are diploid and *Dactylis glomerata* with 2n=14 and 28 is mixaploid(diploid and tetraploid).

Keywords: Cytogenetics, Diploid, Tetraploid, Chromosome

PP137 Qualitative and Quantitative Investigation of Essential Oil Compositions of *Mentha Aquatica* at Different Growth Stages

Rezvan Chegeni*[1], Fatemeh Zarinkamar[1], Mehrdad Nazari[1] -*1. Department of Plant Biology, Faculty of science Biology, Tarbiat Modares University, Tehran, Iran. E-mail: Rezvan_chegeni@modares.ac.ir*

Plant essential oils are useful compounds that have different applications and are used in a wide range of health and pharmaceutical industries. Essential oils and their composition vary among different plant species and are influenced by external factors such as environment, temperature and internal factors such as growth stages .This study aimed to investigate the impact of growth stages on the compositions and amount of *Mentha aquatica* (Water mint) essential oils. The disinfected seeds of Water mint were placed in the dark and wet conditions for germination. Then germination, seeds were transferred to plastic pots, filled with perlite and maintained under greenhouse conditions. Plant leaves were collected at different growth stages (early and late vegetative phase). Plant essential oil was extracted by using Clevenger's apparatus by distillation with water. The composition of the essential oil was determined by GC/MS. Analysis of compounds in the essential oil extracted from *Mentha Aquatica L*, showed an increase in the amount of essential oil in the final stage of growth. Also the composition of the essential oil changed according to the growth stage. The obtained results showed the effect of the growth stage on the amount and composition of essential oil in the Mentha aquatic.

Keywords: Essential oil extraction, GC/MS, early and late growth

PP138 Effect of different levels of irrigation on quantitative and qualitative factors of rosemary (*Rosmarinus officinalis*)

Sudabeh Mafakheri[1], Roghayeh Aminian[2*] -*Faculty of Agriculture and plant resources, Imam Khomeini International University, Qazvin, Iran. E-mail: aminian@eng.ikiu.ac.ir*

Some medicinal plants are drought tolerance and irrigation shortage not only do not damage the plant but also increase the quality of secondary metabolites in this group of plants. In order to investigate the effect of irrigation shortage stress on the quantity and quality of rosemary, an experimental study was conducted in a randomized complete block design with four treatments and three replications in the research greenhouse of Imam Khomeini International University. Experimental treatment included different levels of irrigation (10, 20, 40 and 60% of field capacity or FC). For this purpose, rooted cuttings with uniformed shape and size were prepared and planted in pots. After complete establishment of the plant, experimental

treatments were applied. Plant growth factors were measured weekly. At the end of the experiment, samples of plant branches were harvested and essential oil was extracted by using Clevenger. The oils obtained from three distillations of each treatment were injected to GC and GC/MS. The results showed that different levels of irrigation had a significant effect on the number of branches per plant, so that the highest number of branches was obtained in the treatment of irrigation with 40% of field capacity, but there was non-significant difference in plant height, stem diameter and leaf length and width. Essential oil percentage, leaf chlorophyll content and essential oil compositions were affected by experimental treatments so that the highest percentage of essential oil (1.2%), the highest amount of chlorophyll (56.61 mg / g), alpha-pinene (12.2 %), 1-8-cineole (11.5%) and camphene (9.6%) were obtained in plants under irrigation with 60% FC.

Keywords: Essential oil, Field capacity, Growth factors

PP139 The effect of biostimulants on yield and yield components of medicinal plant of *Lallemantia iberica*

Roghayeh Aminian*[1], Sudabeh Mafakheri[2] - *Faculty of Agriculture and plant resources, Imam Khomeini International University, Qazvin, Iran.* ***E-mail:*** *aminian@eng.ikiu.ac.ir*

In order to study the effect of biostimulants including mycorrhizae, green algae and humic acid on yield and yield components of Lallemantia iberica as medicinal plant, a randomized complete block design with three replications was done in the research greenhouse of Imam Khomeini International University. Biostimulants were studied at four levels including 1- control (without biostimulants), 2- application of mycorrhiza fungi, 3- application of green algae and 4- application of humic acid. In this experiment, plant height, number of branches per plant, number of pods per plant, number of seeds per plant, 1000-seed weight and seed yield per plant were measured. The analysis of variance showed that the effect of biostimulants on all traits except shoot dry weight was significant. The results of mean comparison based on the least significant difference test (LSD) showed that in all the studied traits, the lowest amount of traits was related to the control treatment, the highest amount of height (33.67 cm), the highest number of branches (5), the highest number of pods per plant (41), the highest number of seeds per plant (520), the highest 1000-seed weight (3.97 g) and the highest seed yield per plant (4.1 g) was related to mycorrhiza fungi application treatment.

Keywords: Green algae, Mycorrhiza fungi, Humic acid

PP140 Study the of the effect of bio and chemical fertilizers on agronomic traits of edible mung bean

Roghayeh Aminian*[1], Sudabeh Mafakheri[2] -*Faculty of Agriculture and plant resources, Imam Khomeini International University, Qazvin, Iran. E-mail: aminian@eng.ikiu.ac.ir*

To study the effect of bio and chemical fertilizers on the yield and yield components of mung bean, three-factors experiment were performed in the form of split split plots in a randomized complete block design with three replications in field conditions. Two levels of chemical fertilizer 1- application of 150 kg / ha urea fertilizer and 75 kg / ha superphosphate fertilizer 2- without chemical fertilizer in the main plots; two levels of mycorrhizal fungal fertilizer (application of mycorrhizal fungal fertilizer and without mycorrhizal fungal fertilizer) in sub-plots and four levels of Biozar nano fertilizer (0, 500, 1000 and 1500 g / ha) in sub-plots were evaluated. The experiment results showed that the use of chemical fertilizers and bio fertilizers of mycorrhiza and Biozar nano fertilizer had a significant effect on the studied traits including number of pods per plant, number of seeds per pod, grain protein percentage, grain yield, 1000-seed weight and day to flowering. The highest amount of desired traits was obtained in the conditions of combined use of chemical fertilizers, mycorrhizal fungal fertilizer and Biozar nano fertilizer at the rate of 1500 g / ha. Due to the environmental detrimental effect of chemical fertilizers and the plant's need for nutrients in chemical fertilizers, bio fertilizers can be used as a complete or partial alternative to chemical fertilizers.

Keywords: Mycorrhiza, Biozar nano fertilizer, Yield

PP141 Determination of chromosomes effective in water deficit stress tolerance in some morpho-physiological traits

Roghayeh Aminian - *Faculty of Agriculture and plant resources, Imam Khomeini International University, Qazvin, Iran. E-mail: aminian@eng.ikiu.ac.ir*

The cytogenetic nature of wheat and its alloploid status have made researchers pay special attention to it, especially in chromosomal locating of different traits. One of the methods for determining the chromosomal location of quantitative indicators of drought tolerance is the use of cytogenetic methods such as monosomal analysis and analysis of chromosomal substituted lines, in which chromosomal substituted lines are more stable than monosomal lines and lines have an extra chromosome. Therefore, in order to chromosomal study of morpho-physiological traits of wheat under water deficit stress and non-stress conditions, a complete series of chromosomal substitution lines was used. In these lines, the chromosomes of the Red Egyptian cultivar have been substituted for the corresponding homologous chromosomes of the Chinese Spring variety (Red / CS series). These experiments were performed in a randomized complete block design with three replications under two conditions of water deficit and non-stress. The studied traits included awn length, number and area of stomata in the upper leaf surface, leaf relative water content, stomata conductance and photosynthesis rate. The results showed that under stress conditions, leaf relative water content, stomatal area, stomatal conductance and photosynthesis decreased. In Red / CS series, genome A was the most tolerant to water deficit stress compared to genomes B and D. In all studied traits, under water deficit stress conditions, 3A substitution line was superior to Chinese Spring cultivar. Under non stress conditions, lines 3A and 6B substituted lines were superior to Chinese Spring cultivar. Therefore, chromosomes 3A and 6B most likely have genes that control the traits studied in this experiment. Chromosome 3A probably carries the water deficit tolerance genes.

Keywords: Stomatal traits, alternative line, stomatal conductance

PP142 Examining and contrasting the effects of salinity stress on content of stress related phytohormones in wild and cultivated barley genotypes

Seyed Mohammad Farahabadi , Ali Akbar Ghotbi-Ravandi * - *Faculty of Life Sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran. E-mail: a_ghotbi@sbu.ac.ir*

Salinity is one of the factors limiting the growth and productivity of crops. In this study, the effect of salinity stress on the growth and content of stress hormones in two cultivar of barley (*Hordeum vulgare* L.) was investigated. cultivated barley (Zehak) and wild barley (*Spantaneom*). Barley genotypes were exposed to two salinity levels (0 and 10 mg / g soil). Seeds were cultured after sterilization and after 7 days, NaCl solution was added to the soil and sampling was performed on the tenth day. Soil salinity increased the concentration of sodium and chlorine ions in barley cultivars, which ultimately led to a decrease in growth parameters and an increase in the amount of hydrogen peroxide and superoxide dismutase activity in both genotypes. Also, the levels of abscisic acid, ethylene, jasmonic acid and salicylic acid in response to salinity stress in both cultivars increased significantly compared to the control. Under salinity stress, the amount of hydrogen peroxide, superoxide dismutase activity and the content of abscisic acid, jasmonic acid and ethylene in the cultivated cultivar were significantly higher than the wild cultivar. In general, wild barley genotype seems to be more resistant to the negative effects of salinity stress than the cultivated.

Keywords: Abscisic acid, Ethylene, Growth indices, Jasmonic acid, Salicylic acid, Sodium chloride

PP143 Allelopathic potential of *Ferula assa-foetide* on growth and some biochemical properties in tomato *(Lycopersicum esculentum l.)*

Samaneh Shams[1]*, Behrooz Salehi Eskandari[1], Habibolah Nazem[1] -*1. Department of Biology, University of Isfahan, Isfahan, Iran; *Department of biology, Payame Noor University, Isfahan, Iran. E-mail: samane.shams65@gmail.com*

Ferula assa - foetida is a genus of perennial herbs belonging to the *Apiaceae* family. Despite many reports about the various properties of this endangered Iranian native plant, little attention has been paid to the allopathic properties of it. Allelopathy is the inhibitory or stimulatory effect of one plant on another which is mediated through the release of secondary metabolites. Since chemical pesticides have many adverse effects on health and the environment, this study aimed to investigate the allelopathic effect of *Ferula assa*

- *foetida* on *tomato*. to determine its best concentration with the least inhibitory effect on growth and biochemical factors of them, the most pesticide effect, and finally the capacity of the use of this potential for producing natural pesticides. This experiment was carried out under a completely randomized design with 4 different treatment of extract concentration in 3 replications. Remarkable increases in carotenoid, Chlorophyll a/b ratio, proline, sugar content and a remarkable decrease in physiological factors: total Chlorophyll and protein were observed in line with an increase in *Ferula assa - foetida* Extract percentages, which shows increasing the concentration of aqueous extract of *Ferula assa - foetida* made stress because of the absorption of its effective compounds by the plant. Considering the pesticidal properties of this extract on *Aphids*, the most suitable concentration of the extract, which is recommended for use as a biological pesticide is 15%.

Keywords: Aqueous extract, Pesticide, Physiological factors

PP144 Allelopathic effect of *Ferula assa-foetide* on seed germination factors of *Cucumber* plant

Samaneh Shams[1]*, Behrooz Salehi Eskandari [1], Habibolah Nazem[1] *-1. Department of Biology, University of Isfahan, Isfahan, Iran; Department of biology, Payame Noor University, Isfahan, Iran. E-mail: samane.shams65@gmail.com*

The inhibitory or stimulatory effect of one plant on another which is mediated through the release of secondary metabolites is called allelopathy. *Apiaceae* plants have specified medicinal properties because of their aromatic compounds. To evaluate the effect of aqueous extract of *Ferola assa-foetide* on the seed germination of the *Cucumber* plant, this experiment was performed in a completely randomized design with 4 replication. This experiment consists of different concentration level including: control, 5, 10, 15, 20, 25, 50, 75 and 100% of ferula extract. The traits consist of final germination percentage (FGP), germination index (GI), mean germination time (MGT), radicle length, plumule length, root fresh & dry weight, plumule fresh & dry weight, were evaluated. Remarkable increases in mean germination time and decrease in germination index, final germination percentage, growth parameters were observed in line with an increase in *Ferola assa-foetide* extract percentage. The inhibition of seed germination was observed at concentrations above 50% which shows the toxic effect of compounds of extract. Thus, to evaluate the allelopathic effect of this extract at the vegetative growth stage, Concentrations less than 15% should be used.

Keywords: Aqueous extract, Radicle length, Plumule length

PP146 Comparison of some biochemical traits in two transgenic lines of tobacco in potted conditions

Gita Amini[1*], Hanieh Mohajjel shoja[1], Rouh-Allah Motafakker-azad[1], Elham Mohajjel Kazemi[1] *-1. Department of plant Biology, Faculty of Natural Sciences, University of Tabriz, Tabriz, Iran. E-mail: gita.amini85@gmail.com*

The tobacco plant (*Nicotiana tabacum*) belongs to the Solanaceae family and it is used as a model system in the laboratory. The *rolC* gene induce the hairy root disease in transformed plants which its expression in these plants stimulates *rhizogenesis* and cause the morphological and biochemical alterations. Studies conducted on the tobacco plant have shown that the plant naturally has a homologous sequence of the *rolC* gene of *Agrobacterium rhizogenesis*, called *trolC*. This study was aimed to investigate some biochemical characteristics in two lines of tobacco transgenic plants, *rolC* and *trolC*, under pot culture conditions. The experiments were performed in 3 replications for each sample and data were finally analyzed by SPSS 16.0 software. Excel 2013 software was also used to draw the graphs. The results showed that the difference between control samples and transgenic plants was significant at the 5% probability level. Activity of antioxidant enzymes such as peroxidase and ascorbate peroxidase was increased in induced transgenic plants, while the activity of catalase was decreased and the superoxide dismutase enzyme did not show any significant difference between control and induced plants. Also, in the case of MDA content, there was no significant differences between the control and transgenic plants. The H_2O_2 content was increased in transgenic plants in comparison to non-induced ones. Since the activity of the catalase enzyme decreased and H_2O_2 content increased in induced plants compared to non-induced ones, it is inferred that the stress management has been done through non-enzymatic pathway. The interesting point of this study was the

similar function between *trolC* and *rolC* transgenic plants, and this indicates that the functional characteristics of this gene were protected after transferring to the tobacco plants during the evolution.
Keywords: *Nicotiana tabacum*, *Agrobacterium rhizogenes*, *rolC genw*, *trolC* gene

PP147 Arbuscular Mycorrhizal induces Polyphenols Content of Lemon balm in Pathogen Stress

Zohreh Saderi[1], Parvaneh Abrishamchi[1*], Ali Ganjeali[1], Tayebeh Radjabian[2] -*1. Department of Biology, Faculty of Sciences, Ferdowsi University of Mashhad, Mashhad, Iran, 2. Department of Biology, Faculty of Basic Sciences, Shahed University, Tehran, Iran. E-mail: abrisham@um.ac.ir*

Fusarium culmorum, a ubiquitous pathogen, is one of the growth limiting factors in plants. Such as *F. culmorum* is the causal agent of foot and root rot diseases in lemon balm (*Melissa officinalis* L.). Lemon balm is a medicinal herb in the Lamiaceae family that can form a successful symbiosis with arbuscular mycorrhizal (AM). The most medicinal properties of this plant are due to presence of polyphenolic compounds, such as rosmarinic acid (RA). Due to susceptibility of *M. officinalis* to *F. culmorum* and potential of this species to associate with AM, the present study examined the effect of mycorrhizal on growth and phenolic content in *M. officinalis*, under pathogen stress. *The* mycorrhizal treatments were included plants treated with *Glomus mosseae*, *G. intraradices* and *G. mosseae* + *G. intraradices* inoculums. Leaves of 120-day-old plants were sprayed with pathogen suspension (10^5 conidia). Fresh weights of shoot and root and the percentage of disease incidence (PDI) were estimated 30 days after stress. The total contents of phenols, flavonoids, anthocyanins and phenolic acids were measured using spectrophotometric method. The concentration of RA was also determined by HPLC technique. Pathogen stress decreased fresh weights of shoot (7.07 g) and root (4.42 g) and PDI was 66.67% in lemon balm. *The highest growth parameters* and *the lowest PDI* were observed in plants inoculated with *G. mosseae*. Under pathogen stress, the maximum of total phenols (41.84 mg GAE/g Dw), flavonoids (15.83 mg QE/g Dw), anthocyanins (146.29 µM/g Fw), phenolic acids (32.73 mg RAE/g Dw) and RA (4.60 mg RA/g Dw) were found in plants treated with *G. mosseae*,. Mycorrhizal inoculation (*especially G. mosseae*) improved growth and nutritional and pharmaceutical properties of *M. officinalis*, under fusarium stress. Indeed, the potential of AM fungus in induction of polyphenolic compounds content could increase the resistance of *M. officinalis* to disease.
Keywords: *Melissa officinalis* L., Symbiosis, Disease, Growth, Rosmarinic acid

PP148 The Effect Of Plant Growth Regulators On Callus Induction Of *Matricaria chamomilla*

Shima Alaei[1], Sara Sharifi[1]*, Lia Shooshtari[1], Aiob Jasemi[1] -*1. Plant Biotechnology Research Center, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran. E-mail: sarah.sharifi.59@gmail.com*

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. Cultured plant cells and tissues are recognized as promising alternative for the production of secondary metabolites. In this study, the effect of different combination and concentrations of plant growth regulators on some traites such as diameter of callus, fresh and dry weight of callus, Relative water content and mucilage content were measured. Callus induction was achieved from explants of young leaves on Murashig and Skoog (MS) +0.5 mg/L 2, 4-D+1mg/L BAP,MS+4mg/L NAA+3mg/L BAP and MS+1mg/L 2,4-D+1.5mg/L BAP .Analysis of variance showed that the composition of tissue medium had no significant effect on Relative water content and diameter of callus. In this study, fresh and dry weight of callus were measured as an index of growth. The effect of different concentration of auxin and cytokinin on fresh weight of callus that derived from leaf explant is significant at 1 % probabaly. Murashige and Skoog medium supplemented with 2,4-D (0.5 mg/L) and BAP (1mg/L) showed the highest fresh and dry weight of callus and mucilage content. This prepared callus culture provided a useful material for further biotechnological startegies like suspension cultures and production of secondary metabolite on a large scale.

Keywords: Medicinal Plant, Musilage, Secondary metabolite

PP149 Genetic diversity and differentiation of infected and uninfected populations of *Buxus hyrcana* by blight fungus

Parvin Salehi Shanjnani*, Hamideh Javadi, Mahmoud Amirkhani, Leila Rasoulzadeh - *Research Institute of Forests and Rangelands, Agricultural Research, Education and Extension Organization, Tehran, Iran. E-mail: psalehi1@rifr-ac.ir*

Boxwood (Buxus hyrcana Pojark.) is the most important and valuable broadleaf and evergreen tree species of Hyrcanian forests. Dieback of Box trees caused by Boxwood Blight (*Cylindrocladium buxicola*) and Boxwood moth (*Cydalima perspectalis*) continues to be reported in the Caspian forest. As the most consequences of reductions in the number of breeding individuals within a population involve genetic erosion, the genetic diversity and differentiation of Box trees and their progenies along Hyrcanian forests were studied. Estimation of genetic diversity and differentiation of boxwood populations and their progenies were analyzed by total protein profiles; seed storage protein profiles and seed morphology, respectively. Results indicated that despite dieback large parts of boxwood, their populations show considerable diversity. High band polymorphism was found in pooled samples of boxwoods using both ISSR (13.8%) and RAPD (19.6%) markers. Analyses of healthy versus infected pooled samples based on both markers indicated that genetic parameters were higher in healthy boxwoods. According the results, activity of polyphenol oxidase, amount of proline and soluble sugars significantly increased and percentage of humidity and relative content of humidity increased. Considerable within population diversity, and higher genetic parameters in healthy boxwoods suggested conservation efforts should focus on survivor trees in every population and consider the establishment of tree reservations. Results are useful to the management of the species in *situ* and *ex situ* conservation.

Keywords: Boxwood, *Cylindrocladium buxicola, Calonectria pseudonaviculata,* genetic diversity, marker

PP150 Tepal macro and micro- morphological study of Iranian *Anemone* L. and *Pulsatilla* Mill. (Ranunculaceae)

Mohadeseh Shojaee[1*], Fariba Sharifnia[2] -*1. PhD student, Department of Biology, Science and Research Branch, Islamic Azad University,Tehran, Iran, 2. Associate Prof., Department of Biology, Tehran North Branch, Islamic Azad University, P.O.Box 19585-936, Tehran, Iran. E-mail: shilashoja@yahoo.com*

The genera *Anemone* L. and *Pulsatilla* Mill. belong to the tribe *Anemoneae*, and the family Ranunculaceae. The genus *Anemone* has 150 species around the world and the genus *Pulsatilla* has 35 species which are spread in Europe and Asia. Iran is the border for the distribution region of various *Anemone* species, and, it is the area where the European and Asian taxa are met. Therefore, the study of these two genera in Iran is extremely important. Furthermore, such study can classify the *Pulsatilla* (*P. albana*) species in Iran, which has been an arguing topic among the researchers. Some researchers believe that this species belongs to *Pulsatilla* genus, and some other researchers categorize it as one of the *Anemone* species. In this study, 18 species which belong to 9 taxa of these genera are studied by their tepal macro and micro-morphological features to reveal the importance of these characteristics in identifying the taxa of these genera. In order to increase the accuracy of the results, microscopic studies are performed in addition to macroscopic investigations using the scanning electronic microscope (SEM). Several features are studied, including the size, the shape, the number, the color and the tip of tepals, the size and the shape of trichome base, epidermal pattern, and, the existence or the lack of stoma. Considering the tepal shape, three different shapes are observed which are obovate, ovate and Linear- Oblong. Considering the epidermal pattern, five types are identified which are striate, rugose, highly rugose, reticulate and scale-shaped. The tepal colors are observed to be yellow, white, purple and blue. Using Principal Component Analysis (PCA), features such as the width, color and shape of the tepal, epidermal pattern and tricome density demonstrate the most distinctive characteristics. In the phenogram, depicted by IBM SPSS Statistics software, separation of the *P. albana* from *Anemone* species is completely evident. Furthermore, the adopted features are capable of distinguishing the species, and, even the other varieties.

Key words: Epidermal pattern, Tepal Shape, SEM, Taxon

PP151 Effect of Salinity on the amount of compatible osmolites of three Grape Cultivarsin Vineyards of Urmia, Iran (*Vitis vinifera* L.)

Sonia Torabi*, Naser Abbaspour - *Department of Biology, Faculty of Science, Urmia University, Urmia. E-mail: Saina_1388@yahoo.com*

Salinity is one of the important environmental factors that limits plant growth and production. Grapes are classified as salt sensitive plants.The aim of this study was to investigate the effect of salinity on the content of compatible osmolytes (carbohydrates, proline, glycine betaine) in three grape genotypes *Vitis vinifera* L. (Gharashani, GhezelUzum and Chawga) grown mainly in the lands around Lake Urmia. Increasing the synthesis and accumulation of osmolytes is one of the methods that reduces osmotic stress and salinity. Soluble sugars and propylene can be used in osmotic regulation as compatible solutes.The experiment was performed in three replications as a factorial in a completely randomized design. The results showed that by increasing the salinity level from 0 to 100 mM NaCl, the total carbohydrate content in the roots and leaves of all genotypes increased significantly ($p < 0.05$) which was higher in GhezelUzum than the other two genotypes. The proline content of Gharashani was highest and GhezelUzum was the lowest compared to other genotypes. Salinity had a significant effect on the accumulation of glycine betaine content, so that Gharahshani had the highest and GhezelUzum had the lowest content of glycine betaine at 100 mM salinity. Accumulation of soluble sugars and compatible osmolites increase plant resistance to salinity stress. Glycine betaine appears with stress crisis in plants and is considered as an effective osmotic regulation solution in plants.Considering the results of this study, it seems that Gharashani is more salt tolerant than GhezelUzum and Chawga.

Keywords: Vitis , Salt stress, Compatible osmolytes

PP152 Protein pattern of bread wheat cultivars before and after flowering using SDS-PAGE technique

Zahra Baghaeifar[1], Samira Mostofi[1], Mohsen Farshadfar[2], Fatemeh Ghadirpour*[1]- ***1****. Department of Biology, Faculty of science, Payame Noor University, Tehran. E-mail: ghfatemeh12@yahoo.com*

Protein patterns have been widely used to determine genetic variation in cereals, especially wheat. This study was carried out at Payame-Noor Asadabad University in 2014. To study genetic diversity and protein pattern in bread wheat cultivars before and after flowering 13 bread wheat cultivars were used to prepare protein patterns based on SDS-PAGE electrophoresis. The highest genetic distance before flowering was between Zare and Gascogen (8 units). The lowest genetic distance before flowering was between cultivars with a distance equal to zero. This result indicates high genetic similarity between wheat cultivars. The most similarity between the cultivars is the value of one, such as Pishgam and Sayson (one means one hundred percent similarity) or Pishgam and Bezustaya (one). The least similarity is 0.2 between Zare and Gascogen. Based on cluster analysis, 13 bread wheat cultivars were divided into three groups. The results after flowering were largely similar to the protein pattern before flowering. The most similarity between the cultivars is the value of one. Between Pishgam and Sayson is one (one hundred percent similarity) or Pishgam and Bezustaya (one). The lowest similarity was observed between Zare and Gascogen cultivars with zero and 0.25 between Zare and other cultivars. Based on cluster analysis, 13 wheat cultivars were grouped into four clusters. Increasing one group indicates the effect of some proteins that are effective in the developmental stages before and after wheat flowering.

Keywords: Bread wheat, genetic diversity, biochemical markers, clustering

PP153 Evaluation the allelopathic effects of wheat (*Triticum auestivum* L. cv. Pishgham) on the some metabolites' content of redroot pigweed (*Amaranthus retroflexus* L.) under intercropping

Zahra Alizadeh*, Rouhollah Motafakkerazad, Seyed Yahya Salehi-Lisar - *Department of plant Science, Faculty of Natural Science, University of Tabriz, Tabriz, Iran. E-mail: zahra66alizadeh@yahoo.com*

Allelopathy refers to the beneficial or harmful effects of one plant on other plants, Including crop and weed species, from the release of biochemicals, known as allelochemicals, from plant parts by leaching, root exudation, volatilization, residue decomposition, and other processes in both natural and agricultural

systems. Allelochemicals are a subset of secondary metabolites not required for metabolism (growth and development) of the allelopathic organism. For weed management purposes, allelopathy is considered as an important strategy of control. The aim of recent study was to determine the allelopathic effect of wheat as a crop with allelopathic potential on the content of some metabolites of redroot pigweed. For this purpose an experiment was conducted as factorial based on completely randomized design with three replications. Wheat and redroot pigweed was intercropped under greenhouse conditions in ratios of 100 to 0(as control) and 50 to 50. After harvesting the plants, redroot pigweed shoots were used to assessment of metabolites. The results showed that in the presence of wheat the total flavonoid content, total anthocyanin content, soluble and insoluble sugars content of redroot pigweed shoots decreased significantly compared to the control, but the content of total phenol and total protein of redroot pigweed shoots did not change significantly. The allelopathic effect of allelochemicals depends upon species and tissue concentration, movement, persistence and fate of such biochemicals in the soil. Concentrations of polyphenols under different stress do not follow a regular pattern. The reduction in sugar content can be attributed to the inhibitory effects of allelopathic compounds on the synthesis of photosynthetic pigments. The results of this study showed that the allelopathic effects of wheat are effective in controlling redroot pigweed. In order to enrich results of this research, the study of growth parameters and activity of the enzymatic defense system in both species is suggested.

Keywords: Allelochemicals, Phenol, Flavonoid, Soluble sugar

PP154 Brassinostroides Ameliorates the Salt Stress and Improves the Growth Attributes and Essential Oil Content of Moldavian balm

Bita Zaji[1*], Alireza Iranbakhsh[2], Nargol Salimi[3] *-1. Department of Biology, Kermanshah Branch, Islamic Azad University, 2. Department of Biology, Science and Research Branch, Islamic Azad University, 3. Human biology-health and disease Department, Toronto University, Canada. E-mail: bitazaji@gmail.com*

Brassinosteroids are plant steroidal phytohormones playing important roles in plant growth, development, secondary metabolite accumulation, stress responses and adaptation [1]. Such evidence indirectly confirms the involvement of brassinosteroids, such as 24-Epibrassinolide (EBL) in the development of salt tolerance [2].This study was carried out to determine the effect of EBL applications on the some growth attributes, biochemical properties and secondary metabolite accumulation in moldavian balm (*Dracocephalum moldavica* L.) plants grown at different levels of salt. For this aim, four different NaCl (0, 25, 50 and 75 mM) and three different EBL (0, 2.5 and 5 µM) concentrations were applied to moldavian balm plants. Foliar application of EBL was applied thrice during late afternoon hours with 7d intervals using a hand-held sprayer. All of the investigated parameters were influenced by salinity and EBL. A further reduction observed along with the elevating level of salinity in growth traits and essential oil. EBL detoxified the follow-up parameters from the salinity and significantly ameliorated them especially in 5µM concentration. Notably, EBL could mitigate the deleterious effect of salinity by boosting the activity of antioxidant enzymes, raising total phenol, flavonoids and anthocyanin content. It was determined that 5µM of EBL for 25 and 50 mM NaCl was the most suitable concentrations in terms of injury degree, growth parameters, total phenolic contents and essential oil content in moldavian balm plants.

Keywords: Epibrassinolid, Essential Oil, Total Phenol, Flavonoids, *Dracocephalum moldavica*, Antioxidative Enzymes

PP155 Antioxidant and antibacterial properties of root extracts of *Salvia abrotanoides* (Kar.) Sytsma

Parvaneh Abrishamchi[1*], Arehzoo Zaker[2], Azar Rezaei[1], Maryam Varasteh[1], Masoumeh Bahreini[1] *-1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran; 2. Department of Biology, Farhangian University, Tehran, Iran. E-mail: abrisham@um.ac.ir*

Salvia abrotanoides (Kar.) Sytsma (Russian sage) is one of the Iranian traditional medicinal plant which possesses various bioactivities. In this study, plant roots were collected in seed formation stage from Kalat (Northeast of Iran). Total phenolic and flavonoid contents in ethyl acetate and methanolic extracts of *S. abrotanoides* roots were determined by colorimetric method. Then, the antioxidative activities of the

extracts were evaluated by *DPPH radical scavenging activity* and thiobarbituric acid reactive substance (TBARS) assays. Besides antibacterial activity of these extracts was investigated against gram negative (*Pseudomonas aeruginosa* and *Escherichia coli*) and gram positive (*Staphylococcus aureus* and *Bacillus cereus*) bacteria using serial dilution method. Then minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of the extracts were determined. Methanolic extract of the roots had more total phenolic compounds but less flavonoids content than ethylacetate extract. In both methods tested, the antioxidant activity of ethyl acetate extract was higher than that of methanolic extract. The IC50 values measured for ethyl acetate extract by DPPH *radical scavenging* and TBARS assays were 65.21 and 5.15 µg/mL, respectively. While these values for methanol extract were 132.18 and 10.31 µg/mL, respectively. Both extracts of the roots exhibited effective antibacterial activity. The ethyl acetate root extract had stronger antibacterial effect than methanolic one and significantly inhibited the growth of *E. coli* (MIC and MBC 0.1 mg/mL), *P. aeruginosa* (MIC and MBC 0.05 and 0.1 mg/mL, respectively) and *S. aureus* (MIC and MBC 1.25 and 2.5 mg/mL, respectively). Whereas *B. cereus* was more sensitive to the methanolic extract than ethyl acetate extract with MIC and MBC values 2.5 mg/mL. In conclusion, the roots of *S. abrotanoides*, as a good source of natural antioxidant and antibacterial substances, could be considered as potential candidates for further investigations at pharmaceutical and food industries applications.

Keywords: DPPH**,** Flavonoid, Russian sage, TBARS, Total phenolic

PP156 Genetic diversity of *Zannichellia* L. (Aquatic plant) in Iran

Shabnam Abbasi[1*], Saeed Afsharzadeh[1] *-1. Department of Plant and Animal Biology, Faculty of Biological Science and Technology, University of Isfahan. E-mail: abbasishabnam@yahoo.com*

Zannichellia L. (belongs to Potamogetonaceae) is a widespread aquatic plant genus widely distributed in aquatic ecosystems of Iran. Regarding to significant morphological diversity of this genus (two varieties for this genus in Iran), genetic diversity of populations of this plant would be high. A comprehensive study on genetic diversity of the genus is lacking in Iran. Regarding the considerable geographical location of Iran such as mountain ranges, deserts and plains that causes different habitat types even at a low connectivity, investigation of genetic diversity of this plant in Iran is important. Our aim was to test, genetic diversity of populations of *Z. palustris* corresponding to environmental geographical variations using ISSR and SRAP molecular markers. For this purpose, genomic DNA of 180 individuals was extracted from the leaf tissue using the modified cetyltrimethylammonium bromide (CTAB) method. The results of cluster analysis using NTSYSpc version 2.02 and PCoA using GenALEx version 6.5, demonstrated high genetic diversity of the genus. The results of STRUCTURE analysis using STRUCTURE version 2.3 indicated eight genetic clusters (K = 8) that refers to high importance of the role of different geographic barriers on high genetic differentiation of populations of this plant. A high level of genetic differentiation between populations of *Zannichellia* in Iran indicates essential information for conservational strategy.

Keywords: Genetic differentiation, Geographic barriers, Potamogetonaceae, ISSR, SRAP

PP157 Comparison of phenolic compounds in different organs of three populations of *Salvia abrotanoides* (Kar.) Sytsma in Khorasan Razavi province

Zohreh Moradi Roodmajani[1], Parvaneh Abrishamchi[1,*], Tayebeh Radjabian[2], Hassan Porsa[3] *-1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran, 2. Department of Biology, Faculty of Basic Science, Shahed University, Tehran, Iran, 3. Department of Legumes, Research Centre for Plant Sciences, Ferdowsi University of Mashhad, Mashhad, Iran. E-mail: abrisham@um.ac.ir*

Salvia abrotanoides (Kar.) Sytsma is a shrubby and perennial species of Lamiaceae family and its numerous biological and medicinal properties are associated with the presence of several types of phenolic compounds in plant organs. The amount and type of plant secondary metabolites are affected by environmental stresses and biochemical responses of plants to the stressful conditions. In the present study, the amount of phenolic compounds in leaves, flowers and roots of three populations of *Salvia abrotanoides*, scattered in different regions (Haroonyeh, Hezar Masjed and Joghri) of Khorasan Razavi province, was measured, and Pearson coefficient of correlation was determined between rainfall (as an environmental factor) and amount of phenolic metabolites. After sampling at the flowering stage, methanolic extracts of

different plant organs were prepared by sonication method, and the total contents of phenols, flavonoids and phenolic acids were measured by spectrophotometry. Results showed that the content of phenolic compounds was significantly ($P \leq 0.05$) affected by the population and organ type. The greatest amounts of three groups of phenolic compounds were obtained from the flowers. The highest (3041 mg/100g DW) and the lowest (307 mg/100g DW) contents of total phenols and the maximum (1550 mg/100g DW) and minimum (209 mg/100g DW) values of total phenolic acids were observed in the flower of Haroonyeh and the root of Joghri populations, respectively. Flowers of Haroonyeh population possessed the highest level of total flavonoids with the value of 354 mg/100g DW, while the roots of this population contained the least amount (112 mg/100g DW) of flavonoids. Pearson correlation analysis showed a significant negative correlation ($-0.743 < r < -0.915$) between rainfall and amount of all studied compounds. Haroonyeh population, due to the production of higher amounts of flavonoids and phenolic acids, can be considered as a good candidate for scientific and applied researches related to herbal pharmaceutical products.

Keywords: *Salvia abrotanoides*, Population, Flavonoids, Phenolic acids

PP158 Effect of growth-promoting rhizobacteria on nutrient uptake of bean root under drought stress

Seyyed Jaber Hosseini[1*], Farhad Habibzadeh[2] -*1. Department of Agronomy, Faculty of Agriculture, Tarbiat Modares University, Tehran, Iran; 2. Departmet of Genetics and Plant Breeding, Faculty of Agriculture and Natural Resources, Imam Khomeini International University, Qazvin, Iran. E-mail: jaberhosseini@yahoo.com*

Drought stress is one of the limiting factors for plant growth and has an important effect on the absorption of micro and macro elements. In order to investigate the effect of growth-promoting rhizobacteria on the uptake of nutrients in bean root, a factorial experiment was performed in three replications. Experimental treatments included bacterial inoculation factor for growth stimulation at two levels (inoculation and non-inoculation of bacteria) and drought stress factor at three levels (no drought stress, mild drought stress and severe drought stress). The results showed that the simple effect of drought stress and bacterial inoculation was significant for all studied traits at a probability level of one percent. Also, all studied traits were affected by the interaction of drought stress and bacterial inoculation. The results of mean comparison showed that the highest levels of nitrogen, potassium and phosphorus of bean root were observed in the treatment of drought stress and inoculation of growth-promoting bacteria. In contrast, the lowest levels of nitrogen, potassium and phosphorus of bean root were observed in the treatment of severe drought stress and non-inoculation of growth-promoting bacteria. The results of iron, zinc, copper and manganese showed that the mentioned traits were affected by drought stress and increasing stress reduced them, while inoculation of growth-promoting rhizobacteria was able to increase the amount of iron, zinc, copper and manganese elements of the roots. The results of correlation coefficients showed that there was a positive and significant correlation between all studied elements in bean root.

Keywords: Bean, drought stress, inoculation, root

PP159 Evaluation and regeneration of Ferula assa-foetida

Parvin Salehi Shanjnani[*], Ali Ashraf Jafari, Mahmoud Amirkhani, Leila Falah Hoseini, - *Research Institute of Forests and Rangelands, Agricultural Research, Education and Extension Organization, Tehran, Iran. E-mail: psalehi1@rifr-ac.ir*

Ferula assa-foetida is a Monocarpic and Monoecious plant of family Apiaceae that is native of moist and semi-arid mountainous regions of Iran. In this research 1) regeneration of 100 accessions of the Natural Resources Gene Bank 2) seed germination analysis 3) variation of seed morphological traits of 30 accessions, 4) genetic diversity of 30 accessions by seed storage proteins by SDS-PAGE method were studied. The results showed that the asafetida seeds had a relatively long dormancy period. Moist-chilling is dormancy-breaking treatment for deep morphophysiological dormancy of the asafetida seeds. Duration of moist-chilling treatment among different accessions varied from 7 to 64 days, indicated considerable variation in the germplasm of this species. Although it seems restoration of asafetida plants in the Karaj region (with altitude of 1300 meters above sea level) is possible, the plantation of the plants in Karaj was not successful. The lack of establishment of asafetida accessions in Karaj region is due to global warming. Regeneration of the asafetida carried out at the Humand Station, (with altitude of 1950 meters above sea

level) successfully. Comparison of Seedling and Seed planting methods in field showed that the seedling planting was more successful than Seed planting. Therefore, it is recommended to use the seedling method to restore this species. The results of this study indicate that the use of morphological and seed storage proteins markers were effective for genetic diversity analysis in asafetida. High morphological and genetic variation among asafetida accessions is due to cross-pollination in this species. The high genetic diversity can be used in different breeding, classification and identification programs.

PP160 Medicinal use of, Silybum marianum L, Glycyrrhiza glabra L, Malva neglecta wallr, Artemisia absinthium L, in East of Golestan (Turkmens)

Razieh Saadaty [1]* , Ali Sattarian , Abolfazl Daneshvar , Elham Amini- *1. Biology Department, Faculty of Science, Gonbade kavus University, Golestan, Iran. E-mail: razieh.saadaty@gmail.com*

Humans have been in contact with the plants which are surrounded them, and the belief in the healing of planta has long existed among the people. Due to the increasing public interest in natural and herbal remedies, it is important to study the indigenous knowledge of people in a particular area and culture. Golestan province, due to its different ethnic groups and cultural varieties it is a good conditions for reviewing medicinal plants information, the Turkmen people in this province, have been able to make the most of the potential of nature in terms of their cultural, ethnicity and geographical structure. The objectives of the present research were to collect and classify medicinal plants in eastern region of Golestan province with emphasis on Turkmen ethnicity, by the use of experiences of Turkmen people who lives in east of Golestan it was were about 30 villages in the Turkmen province (east of the Golestan province) and interviewing with local skilled people, including women and men, medicinal plants of the region, method of use, time of use and their application are recorded. In this study the four plant species are of important and useful. The indigenous people of the region, from the shot Silybum marianum L, to reduce blood pressure and blood sugar, the mentined plant is used for heart disease as well as fatty liver. From the Artemisia absinthium L, for stomach ache, constipation and stomach diseases, from the root of Glycyrrhiza glabra L, for ulcer peptic and vein cramps, from the Malva neglecta wallr, used to relieve joint pain, cough and infection. Most of these plants were harvested at the end of the growing season, and the method of use was decoction or sap. Various investigations have proved the medicinal properties mentioned by the indigenous people for the mentioned plants by examining the available chemical constituents.

Keywords: Medicinal plant- Turkmen villages- Fatty liver- Plant sap

PP161 The Effect of Biological and Chemical Fertilizer on Quantity And Quality of Essential oil Of *Satureja hortensis* in Khuzestan Provience

Shima Alaei *[1], Sara Sharifi [2], Ozra Yazdi [3]- *1. Plant Biotechnology Research Center, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran 2. Department of Biology, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran 3. Department of Medicinal Plants, ACECR Institute of Higher Education, Kermanshah, Iran. E-mail: Shima1354al@yahoo.com*

Satureja hortensis is one of valuable and aromatic medicinal plant whose essential oil is widely used in different industries. Investigation by using the different treatments of nitroxin biofertilizer combined with chemical fertilizer urea on percentage and compostion of essential oil of savory was conducted based randomized complete block design with three replication. Analysis variance of data showed that the percentage and yield of essential oil were significantly affected by experimental treatments. The highest essential oil percentage (1.97%) and yield was in plants grown on 100% biofertilizer seed treatment in comparision with control. The highest of main components were carvacrol, γ- terpenin, α- terpenin, p-cymen in all treatments. Combination of chemical and biological fertilizer by irrigation method increased the main effective compounds such as, α- terpenin and γ- terpenin with compared to other measured treatments. The highest content of carvacrol (53.57%) was in chemical fertilizer treatment while lowest content of γ-terpenin (34.52%) in control. The amount of hydrocarbon containing monoterpenes of essential oil increased in 100% biofertilizer seed treatment and 50% chemical fertilizer+ 50% biofertilizer seed treatment in comparision with samples of control and without the use of bio fertilizer. Result of this study

showed that the use of biofertilizer alone or combined with chemical fertilzer have a positive effects on content of essential oil percentage and effective composition of *satureja hortensis*.Our result are consistent with the studies of other scientists .

Key words: Effective compounds,Medicinal plant, Nitroxin

PP162 Effect of salicylic acid pretreatment on biomass production and photosynthetic pigments content in *Chenopodium murale* under zinc oxide nanoparticles treatment

Saadieh Taherbahrani [1*], Parzhak Zoufan[1] , Behrooz Zargar[2]-*1. Department of Biology, Faculty of Science, Shahid Chamran University of Ahvaz, Ahvaz, Iran, 2. Department of Chemistry, Faculty of Science, Shahid Chamran University of Ahvaz, Ahvaz, Iran. E-mail: sadieh.bahrani@gmail.com*

The aim of this study was to investigate the effect of salicylic acid (SA) pretreatment on the biomass production and growth in *Chenopodium murale* L. exposed to ZnO nanoparticles (ZnO NPs). The ZnO NPs due to the unique properties are widely used in industrial, commercial, and medical products, as well as in drilling activities related to the oil industry. The increased use of metal nanoparticles can lead to the entry of these particles into the food chain and ultimately affect the health of living organisms. The SA is a plant growth regulator that controls several plant physiological processes and tolerance to biotic and abiotic stresses. The plant seeds were collected from the area around Ahvaz oil field, transferred to the laboratory, and cultivated under controlled conditions. Then, under hydroponic culture, the effect of different SA pretreatments including 0, 25, 75, and 150 µM was evaluated in the plants treated with 50 mg L^{-1} of ZnO NPs. The results showed that the SA pretreatments, especially 150 µM, could increase the length, fresh weight, dry weight, and chlorophyll content. In addition, the SA pretreatments reduced carotenoids content in the plants exposed to 50 mg L^{-1} of ZnO NPs. Based on these results, it is suggested that the use of exogenous SA at appropriate concentration can greatly increase the plant growth and yield by reducing the ZnO NPs toxicity. Therefore, its use in the soils contaminated with ZnO NPs can be recommended for the phytoremediation purpose to increase plant yield.

Keywords: Growth, Chlorophyll, Carotenoids

PP163 Total Phenolic Content (TPC) determination of cold and hot water extracts of *Echinophora platyloba* DC. Medicinal plant collected from Maragheh (East Azarbaijan, Iran)

Seyedeh Arezoo Mousavi [1], Ahmad Aghaee[*2]- *Department of Biology, Faculty of Science, University of Maragheh. E-mail:aghaee@maragheh.ac.ir*

The aim of the present study was to investigate total phenolic content (TPC) of cold and hot water infusions (room temperature for 2 h and 90 ºC hot water for 5 min) from aerial parts of four different samples of *Echinophora platyloba* medicinal plants (Apiaceae or Umbelliferae) collected from different sites of Maragheh County (Kamel Abad, Tazeh Kand, Ekis and Golshahr). Results indicated that, the phenolic content of hot infusions was 38.657 ± 1.557 milligram of Gallic Acid equivalent per gram Dry Weight (mg GAE/ gDW) to 72.307 ± 2.897 mg GAE/ gDW and TPC of cold infusions was 42.768 ± 1.174 mg GAE/ gDW to 49.585 ± 0.374 mg GAE/ gDW. This study showed that the TPC values of hot water extracts prepared from Khousharizeh medicinal herbs using the Folin-Ciocalteu method was significantly different. The difference among samples was greatest in hot water infusions of Kamel Abad (72.307 ± 2.897mg GAE/ gDW). The results of this study indicate the presence of phenolic compounds that may provide the scientific basis for the traditional use of Khousharizeh and may provide valuable knowledge for future scientific research.

Keywords: Apiaceae, Folin-Ciocalteu Method, Khousharizeh, Medicinal Herbs, Umbelliferae

PP164 Effects of Cyanobacterial application on production on phytohormones responsible for growth in wild and cultivated barley genotypes

Fatemeh Alzahra Neyshaboori, Seyed Mohammad Farahabadi, Zeinab Agha Shariatmadari , Ali Akbar Ghotbi-Ravandi* - *Faculty of Life Sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran. E-mail: a_ghotbi@sbu.ac.ir*

Due to the growing need of human race for food production, the use of biofertilizers to improve the quantity and quality of agricultural yield is increasing. Cyanobacteria are a diverse group of prokaryotes that possess a high potential for biofertilizer applications. The present study examined the effects of cyanobacteria, *Phormidium* sp., as a biofertilizer on growth and production of phytohormones responsible for growth in wild and cultivated barley (*Hordeum vulgare* L.) genotypes. For cyanobacterial application, *Phormidium* suspension with a concentration of 4 g L^{-1} was added to the soil two weeks prior to the sowing the seeds. *Phormidium* treatment led to increase in content of auxin, gibberellic acid, kinetin and zeatin in both wild and cultivated barley genotypes. The increase in content of auxin, kinetin and zeatin was more prominent in cultivated genotype compared to wild genotype. Similarly, *Phormidium* treatment caused an increase in absorption and content of nitrogen and potassium in both genotypes. Increase in growth indices including dry weight was also observed upon *Phormiduim* treatment in both cultivars. Considering remarkable growth promoting effects and positive effects of production of phytohormones in barley, *Phormidium* may offer a candidate as biofertilizer in sustainable barley production.

Keywords: Auxin, Biofertilizer, Cytokinin, Gibberellins, *Phormidium*

PP165 Determination of concentration of Nitrate in vegetables in Bam City

Fereshteh Mohamadhasani javar -*Biology Department, Payame Noor University, Bam, Iran*. *E-mail: Fereshtehmhasani@yahoo.com*

More than 80% of human dietary intake of nitrate comes from vegetables. Nitrate is converted to nitrite and nitrosacids, which can combine with primary and secondary amines, producing nitrosamines. Nitrosamines have hazardous effects on human health .Vegetables especially leafy ones are the major source of nitrate and nitrite in human diet, because of the potential health hazards result in high intake of nitrate and nitrite, determination of these ions content in vegetables has been considered and measured in many countries. The aim of this research was to determine the concentration of nitrate in leafy vegetables in bam city.So the samples of vegetables have been gathered from and so, the content of nitrate in vegetables was determined. farmlands of Bam city According to the result, the average of nitrate content in all of samples was less than standard.

Key words: Vegetables, Nitrate content, Bam city

PP166 An ethnobotanical study of some medicinal plants in Semnan city

Fahimeh Ghamari[1], Atefe Amirahamdi[*1], Reza Naderi[1]- *1. Department of Plant Science, School of Biology, Damghan University, Damghan. E-mail: a.amirahmadi@du.ac.ir*

Ethnobotany consists of the words Ethno and Botany. This science studies the correlation between plants and people in an area, and provides information about the consumption and application of plants in an area. Analysis and use of the obtained information play an important role in the development of various fields such as trade and pharmacy. This research is concerned to study the most widely used plants of Semnan city and information about their consumption type in this area. In this study, the most widely used plants of Semnan city were identified using the information of sellers of plant products, personal interview and observation of plants, and the obtained information was compiled in the form of a questionnaire. In the interviews, the names of 10 best-selling plants, nature, organs used, how to use and their properties were asked, and then the scientific name and family name were added for each plant. Interviewees mentioned a total of 70 plants, which belonged to 36 plant species and 20 families. The families Lamiaceae with 13 species and Apiaceae with 9 species were the richest families. According to the results, the most used part of plants in this region is leaves and the most used method is in the form of decoction. Also, the plants mostly are used to treat digestive problems, treat neurological diseases, strengthen nerves and be sedative. Existence of various herbal products stores in Semnan city, which are the place of supply of medicinal plants and spices, shows the attention and interest of its people to medicinal plants. Understanding people's

approach to the use of medicinal plants can be a good guide for the country's trade and pharmaceutical industry. We recommend that research be done in other cities of Semnan province.

Keywords: Traditional market, consumable medicinal plants, drug, Lamiaceae, Apiaceae

PP167 Genetic diversity of *Potamogeton nodosus* Poir. in Iran

Neda Aghaei[1*], Shabnam Abbasi[1], Saeed Afsharzadeh[1]-*1. Department of Plant and Animal Biology, Faculty of Biological Science and Technology, University of Isfahan. E-mail: nedaaghaei.1994@gmail.com*

Potamogeton nodosus Poir. is one of the most important species of the genus Potamogeton belongs to the Potamogetonaceae. This submerged plant with permanent floating leaves is widely distributed in the freshwater to the brinewaters of Iran that shows high morphological diversity. So far, there has not been any study on the genetic diversity of Potamogeron nodosus using molecular markers, so the purpose of this study is to investigate the genetic diversity of different populations of this species in Iran. Understanding the genetic diversity of this species can be mentioned as a useful resource for management programs to protect the country's environment. For this purpose, 12 different populations of this species in aquatic habitats of Iran were collected, their morphological features were studied, and then genetic diversity of them was examined using SRAP molecular markers. Based on the analysis of PCoA, the populations were divided into four groups corresponding to their geographical distributions including north, center, southwest and southeast. But in cluster analysis, only the northern populations were well separated from the other populations. The results of STRUCTURE analysis also revealed two separate groups of populations based on their geographical distributions. According to observed differences in the different analyses, it is suggested that in future more molecular markers such as ISSR be used to identify the relationships between the results of the morphological and genetic studies and evaluate the correlation between them.

Keywords: Aquatic plant, molecular marker, Potamogetonaceae, ISSR, SRAP

PP168 Effect of nitric oxide, titanium dioxide, nano silicon dioxide and iron nano oxide on *Linum usitatissimum* germination indices

Fatemeh Nejadhabibvash[1]*, Zeinab Rashidi[2], Arsalan Pirvash[2] - *1. Department of Biology, Faculty of Science, Urmia University, Urmia, Iran, 2. Department of Medicinal Plants, Shahid Bakari Highe Education Center of Miandoab, Urmia University, Urmia, Iran. E-mail: f.nejadhabibvash@urmia.ac.ir*

In order to investigate the effect of nano fertilizers on germination of experimental *Linum usitatissimum* oil in a factorial design with completely randomized design with three levels of titanium dioxide (10, 50 and 75 mg /L), three levels of iron nano oxide (25, 50 and 75 mg/L) and nano silicon dioxide at three levels (10, 50 and 75 mg/L) in 3 replications in 2020. The results showed that treatments had significant effect on germination percentage, germination diameter and number of germs at 1% probability level but no significant effect on germination rate, germination index, seed vigor index and germination length. The highest germination percentage, number of bud and diameter of shoot were observed in titanium dioxide treatment. Overall, among the nanotreatments used, titanium dioxide nanoparticles at 10 mg/L increased the properties studied. According to the results of this experiment, application of titanium dioxide on flaxseed can provide faster germination and stronger seedlings.

Keywords: germination, nano silicon dioxide, nitric oxide

PP169 Anther and Ovule Development in *Scrophularia valida* L.

Bahareh Mohammadi [1], Mohammad Doostali [1*], Mahsa Aminsalehi [1], Abdolkarim Chehregani Rad [1]- *1 . Department of Biology, Faculty of Sciences, Bu-Ali Sina University, Hamedan, Iran. E-mail: M.doostali@sci.basu.ac.ir*

Embryology can provide useful information for determining taxonomic and phylogenetic relationships at the genus level. The aims of this research were to analysis of anther and gynoecium structure and the development of male and female gametophytes in *Scrophularia valida* the. Buds, in various developmental stages, were collected, fixed in FAA, preserved in 70% ethanol, embedded in paraffin and sliced with a

rotary microtome. Results showed that the microsporogenesis and male gametogenesis features of *S. valida* included bisporangiate anther, dicotyledonous-type of anther wall formation, secretory tapetum, simultaneous cytokinesis in pollen mother cells, tetrahedral and tetragonal microspore tetrads and two-celled mature pollen grains. The tapetal cells are mainly uninucleate, but some are binucleate. The nuclei of these cells is large, indicating their high metabolic activity. The mature pollen grains are spherical in the polar view, elliptic and oblong in the equatorial view and are tricolpated. Ovule is anatropous, unitegmic and tenuinucellate. A linear megaspores tetrad is observed and the functional megaspore is chalazal one. In the study, like many species of scrofulariaceae, the mature embryo sac is of the *polygonum* type, which is the most common type among angiosperms and is considered as a primary feature. Antipodal cells are persistent and their nuclei become merged. They are also able to form an embryo at the chalazal pole, which detects apogamy in the species. One of the unusual features of *S. valida* is formation of hypostase that occupy large part of the ovule. *S. valida* is a primitive species regarding of hypostase long-life due it has stable large hypostase in the mature embryo sac.

Keywords: Microsporogenesis, Megasporogenesis, Pollen grain, Embryo sac

PP170 Effect of nanoceria on early growth stages and physiological characteristics of camelina seedlings under sodium nitroprusside and drought stress

Ali Sepehri*- *Department of crop production and plant genetic, college of agriculture, Bu-Ali Sina University. E-mail: Sepehri2748@gmail.com, a_sepehri@basu.ac.ir*

In order to investigate the effect of cerium nanoparticles on germination and physiological characteristics of camelina sativa under the influence of sodium nitroprusside and drought, a factorial experiment was conducted in a completely randomized design with three replications in the Crop Physiology Research Laboratory of Bu Ali Sina University. The effects of cerium nanoparticles at concentrations of 0, 250, 500 and 1000 mg/Land 100 μM of sodium nitroprusside under drought stress levels of 0, -0.4 and -0.8 MPa were investigated. Drought stress was associated with an increase in mean germination time and activity of superoxide dismutase, catalase, ascorbate peroxidase enzymes and a decrease in rate and percentage of germination. Application of 500 mg/L nanoceria with 100 μM sodium nitroprusside increased germination percentage and seed vigour index under drought stress. The mentioned treatment increased the activity of catalase, superoxide dismutase and ascorbate peroxidase enzymes by 15.5%, 18.7% and 31.1%, respectively, and decreased the amount of malondialdehyde in camelina seedlings by 30.5%. Therefore, application of 500 mg/L nanoceria in the presence 100 μM of sodium nitroprusside reduces the adverse effects of drought stress in the early stages of growth and leads to better establishment of camellia seedling by improving germination indices and promoting the antioxidant defense system.

Keywords: Antioxidant, Camelina, Germination, Nanoceria, Nitric oxide

INDEX

Keynote Speakers
(Page IBS2020-K 1-13)

Invited Speakers and their co-authors
(Page IBS2020-I 1-27)

Plant Biology
(Pages IBS2020-P1-82)

21st National & 9th International Congress on Biology

Faculty of Basic Science
Dep. For Biology
Semnan University
Semnan, IRAN

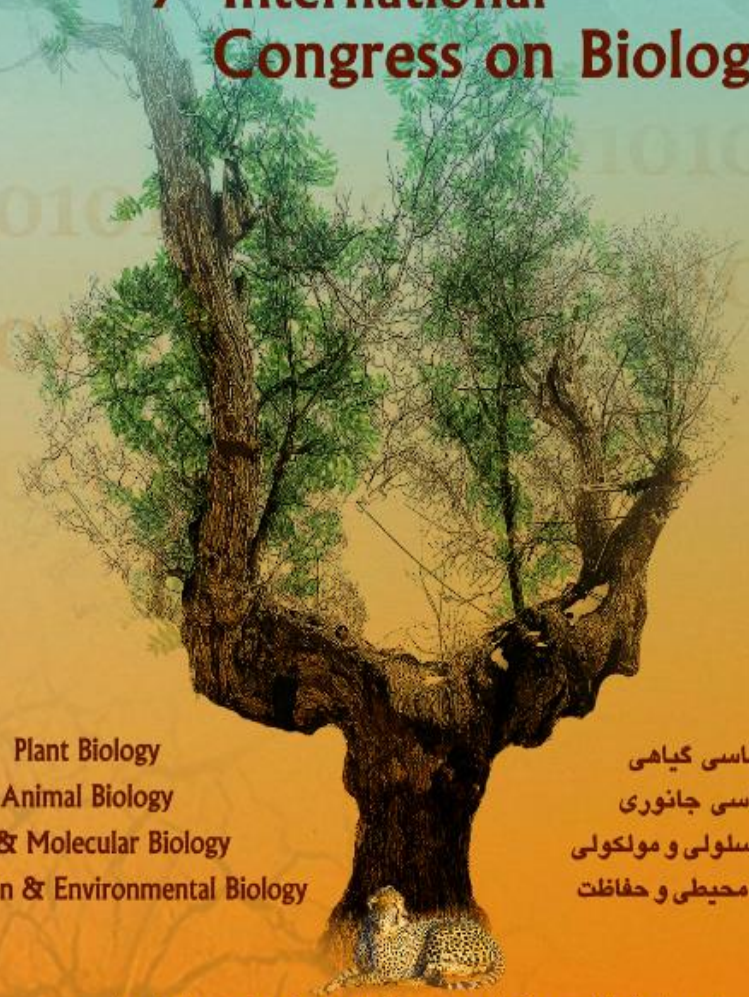
بیست و یکمین کنگره ملی و
نهمین کنگره بین المللی
زیست شناسی ایران

جهت آگاهی از برنامه ها به سایت رجوع کنید
با توجه به تعویق برگزاری

سمنان، دانشگاه سمنان، ۱۸ الی ۲۰ شهریور ماه ۱۳۹۹

Semnan University, Semnan, Iran, 8-10 Sep. 2020

21th National & 9th International Congress on Biology



Plant Biology
Animal Biology
Cell & Molecular Biology
Conservation & Environmental Biology

زیست شناسی گیاهی
زیست شناسی جانوری
زیست شناسی سلولی و مولکولی
زیست شناسی محیطی و حفاظت

زیست شناسی یکپارچه: همگرایی برای توسعه پایدار

Integrative Biology: Convergence for Sustainable Development

www.ibs2020.semnan.ac.ir

ISC

طراحی: نیلوفر یوسفی کمالی