



**THE THIRD
INTERNATIONAL SYMPOSIUM
ON BIOLOGY OF RARE
AND ENDEMIC PLANT SPECIES**

19-23 APRIL 2014 ANTALYA, TURKEY



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Preface

The Third International Symposium on “Biology of Rare and Endemic Plant Species (for short BIORARE-2014) is organized and planned to be repeated every other years to share and to discuss recent developments and data on biology, conservation and evolution of rare and endemic plant species. The main goal is to bring senior scientists and students of the field in an informal, but rigorous discussion platform to stimulate future researches and collaborations on population biology, genetics and genomics, evolution-speciation, and conservation genetics of rare and endemic plants. Especially, it is essential for taxonomists and geneticists to get together and communicate with a common language of evolutionary biology so further insights in speciation and evolution of rare and endemic plant species could be achieved.

The BIORARE-2014 symposium has attracted diverse group of researchers from 20 countries including Turkey. Total of 49 oral presentations are going to be presented in the symposium on April 20-23, 2014. Additionally, total of 58 diverse and interesting poster presentations will be available for the symposium participants to view.

On behalf of organizing committee, I would like to welcome you all and wish you a productive meeting and good times in the Sunny Beaches of Antalya, Turkey.

April 15, 2014

Prof. Dr. Zeki Kaya
The Chair of BIORARE 2014

THE PROGRAM OF BIORARE-2014 SYMPOSIUM

19 APRIL 2014 –SATURDAY	
ROOM A	
14:00-20:00	Registration
20 APRIL 2014 – SUNDAY	
ROOM A	
07:00-9:30	Registration (Continued)
9:30:9:45	Zeki KAYA, Welcoming Speech
9:45-10:00	Opening talks
ROOM A	Session Moderators: Burcu ÇENGEL, Zeki KAYA
10:00-10:40	Tracing rare andendemic plant specieswith DNA analysis techniques. Bertold HEINZE*
10:40-11:00	Coffee Break
11:00-11:20	Tolerance to bark beetle damage in <i>Picea orientalis</i> : Molecular evidence. Fatih TEMEL*, Aslı ÖZDİLEK, Gaye KANDEMİR, Zafer ÖLMEZ, Zeki KAYA
11:20-11:40	Genetic variation of European beech (<i>Fagus sylvatica</i>) populations in Turkey. Gaye KANDEMİR, Yasemin TAYANÇ, Burcu ÇENGEL, Ercan VELİOĞLU
11:40-12:00	Geneticstructures of <i>Salixalba</i> and <i>Salixexcelsa</i> clone banks assessed by microsatellite DNA markers. Funda DEĞİRMENCİ*, Pelin ACAR, F. Alptekin KARAHAN, Zeki KAYA
12:00-12:20	Determination of genetic variation in rare endemic plant <i>Verbascum calycosum</i> . Emel SÖZEN*, Muhip HİLOOĞLU, Ali KANDEMİR
12:30-14:00	Lunch / Poster Mounting
ROOM A	Session Moderators: Sertaç ÖNDE, Habib AHMAD,
14:00-14:40	Conservation genetics and genomics of forest trees. Om P. RAJORA
14:40-15:00	Restoration of <i>Taxus cuspidata</i> at disturbed spots for forest genetic resources conservation in Mt. Taebaek, South Korea. Hong KYUNG-NAK*, Lee JEI-WAN, Park EU-JIN, Im HYO-IN

15:00-15:20	Relict populations of Caucasian wingnut (<i>Pterocarya pterocarpa</i> (Michx.) Kunth) in Southern Turkey. Mustafa YILMAZ*, Zeynep YAVUZ
15:20-15:40	Conservation status of threatened flora of district Shangla, Pakistan. Sultan-UD-DIN, Habib AHMAD, Haidar ALI*
15:40-16:00	The endemic plants of Kyrenia Mountains: Threats and Conservation Özge ÖZDEN*
16:00-16:20	Coffee Break
16:20-16:40	Reproduction biology and ex-situ conservation of two species of the genus <i>Iris</i> (Iridaceae) - <i>I. iberica</i> Stev. and <i>I. caucasica</i> Stev. Tsira MIKATADZE-PANTSULAIA*, Tinatin BARBLISHVILI
16:40-17:00	Current scenario and biodiversity loss specially rare and endemic flora of Pakistan. Fazal AMIN*
17:00-17:20	Increasing the economic benefit of high value medicinal and aromatic plants to Pakistani communities: an analysis of current practices. Hassan SHER*
17:20-18:40	Poster Session
21 APRIL 2014 – MONDAY	
ROOM A	Moderators: Om RAJORA, Yasemin TAYANÇ, Emel Sözen
08:30-09:10	Managing wildfire risk for biodiversity conservation: Case studies from the US and Mediterranean region. Alan AGER*
9:10-9:50	Wildfire Risk Simulation Methods and Application to Protected Area Management. Mark A. FINNEY* and Alan A. AGER
9:50-10:10	The Effects of fire on Turkish Red Pine (<i>Pinus brutia</i> Ten.) forest vegetation and indications for post-fire restoration. Ali KAVGACI
10:10-11:30	Determination of the current status of the endemic and rare taxa in Muğla Forestry Regional Directorate. Nihal ÖZEL*, H. Handan ÖNER, Nuran ALTUN
10:30-11:00	Coffee break
11:00-11:40	Architecture and breeding systems in Apiaceae. Regine CLAßEN-BOCKHOFF
11:40-12:00	Preliminary data of revision of the Genus <i>Lamium</i> L. (Lamiaceae) in Turkey. Ferhat CELEP*, Bilgehan BİLGİLİ, Fergan KARAER, Musa DOĞAN, Hakan METE DOĞAN, Zeynep ATALAY
12:00-12:20	Notes on Endemic <i>Aristolochia hirta</i> L. Complex. Ayca TOSUNOGLU*, Hulusi MALYER

12:20-13:30	Lunch
ROOM A	Moderators: Mark FINNEY, Alan AGER, Gaye KANDEMİR
13:40-14:00	Phylogenetic differentiation of <i>Triticum</i> and <i>Aegilops</i> species by ATR-FTIR Spectroscopy. Sertaç ÖNDE*, DEMİR, P., Berk BENLİOĞLU, Melahat BİRSİN, Murat ÖZGEN, Feride SEVERCAN
14:00-14:20	Polymorphism in seed endosperm proteins (gliadins and glutenins) of Turkish cultivated Einkorn Wheat [<i>Triticum monococcum</i> ssp. <i>monococcum</i>] landraces. Sibel KESKİN ŞAN, Özlem ÖZBEK*, Vehbi ESER, Belgin GÖÇMEN TAŞKIN
14:20-14:40	Molecular phylogeny of <i>Triticum</i> and <i>Aegilops</i> genera based on complete sequences of ITS rDNA gene. Çiğdem KANSU*, Ayten DİZKIRICI, Sertaç ÖNDE, Berk BENLİOĞLU, Melahat BİRSİN, Murat ÖZGEN, Zeki KAYA
14:40-15:00	Phylogenetic relationship of six <i>Astragalus</i> sections based on non-coding <i>trn</i> regions of chloroplast genome. Mevlûde Alev ATEŞ*, Seher KARAMAN ERKUL, Sertaç ÖNDE, Zeki KAYA
15:00-15:20	Coffee Break
ROOM A	Moderators: Hasan SHER, Hayri DUMAN, Berthold HEINZE
15:20-15:40	Diversity of some quantitative characters of Oriental Sweetgum (<i>Liquidambar orientalis</i> Mill.). Murat ALAN*, Ercan VELİOĞLU Turgay EZEN, Sadi ŞIKLAR, Hikmet ÖZTÜRK
15:40-16:00	Phylogenetic relationships of some Turkish <i>Salix</i> sp. Inferred from <i>matK</i> sequence data. Pelin ACAR *, Yeliz TÜMBİLEN ÖZER and Zeki KAYA
16:00-16:20	Comparison of photosynthetic efficiencies of endemic and common <i>Centaurea</i> species under salt and drought stresses. Şeküre ÇULHA ERDAL*, Nuran ÇİÇEK, Hüsnu ÇAKIRLAR, Ayşe BOŞGELMEZ
16:20-16:40	Genetic control of cellulose, lignin and glucose contents in European black poplar (<i>Populus nigra</i> L.) Populations from Turkey. Bircan TAŞKIRAN*, Zeki KAYA
16:40-17:00	Seasonal changes of cold-related antioxidant enzyme activities in black poplar (<i>Populus nigra</i>) individuals. Evrin ZEYBEK*, Kubilay YILDIRIM, Zeki KAYA
17:00-17:20	Effect of conditions and periods of conservation in gene bank on germination and viability of <i>Acacia tortilis</i> spp. <i>tortilis</i> and <i>Acacia tortilis</i> spp. <i>raddian</i> . El-Sayed Mohamed EL-AZAZİ, ElSayed Ali Mohamed KHALİFA, Mohamed Mahmoud SOUROUR, Abdel Fatah BELAL, Reda Mohamed RİZK
17:20-17:40	An approach to the phylogeny of genus <i>Centaurea</i> L. Where by cpDNA sequences of non-coding region of <i>trnL</i> (UAA) intron. Gülden DOĞAN, Eyüp BAĞCI, Aslı ÖZDİLEK*, Zeki KAYA

17:40-18:00	Somatic embryogenesis and synthetic seed production in <i>Amsonia orientalis</i> Decne. Ruhiye KIRAN*, Arda ACEMİ, Fazıl ÖZEN
19:30-??	GALA DINNER
22 APRIL 2014 – TUESDAY	
09:00-18:00	Field Trip: Feslikan Yaylası with the Scientific Guidance by Hayri DUMAN and Zeki AYTAÇ
23 APRIL 2014 – WEDNESDAY	
ROOM A	Moderators: Fatih Temel, Zeki AYTAÇ, Eyüp BAĞCI
09:00-09:20	The essential oil composition and antioxidant activity of <i>Achillea</i> spp. growing in south west of Iran Roosbeh FARHOUDI*, Mohammad Amin MEHRNIA
09:20-9:40	The medicinal use of the Algerian plant <i>Pallenis spinosa</i> and its chemical investigation Ammr Dibi*, A. Jebara, F. Bitam, M.C. Aberkane
9:40-10:00	Phytochemical composition and biological assays of the aerial parts of <i>Thymelaea hirsuta</i> essential oil from Tunisia. Ines Ben CHOBBA, Samir FELHI, Mouna CHAAIBIA, Riadh Ben MANSOUR, Ahmed BÉKIR, Noureddine DRIRA, Néji GHARSALLAH, Adel KADRI*
10:00-10:20	Detection of tomato chlorotic dwarf viroid from <i>Pittosporum</i> plants. Amine ELLEUCHA*, Olfa ELLOUZEB, Hafedh MEJDOUBA, Noureddine DRIRAA, Adel KADRIA
10:20-10:40	Coffee break
ROOM A	Moderators: Fatih Temel, Zeki AYTAÇ, Eyüp BAĞCI
10:40-11:00	Pharmacological importance of <i>Disocorea deltoidea</i> and its conservation status in Indian Himalaya regions. Sandeep PANDEY*
11:00-11:20	Comparison and distribution of bacterial endophytic flora composition of the Brittle Leaf Disease (Maladie de la Feuille Cassante: MFC) of the date palm tree (<i>Phoenix dactylifera</i> L.). Ines Ben CHOBBA*, Amine ELLEUCH, Mouna JRAD, Ahmad NEMSI, Frederique CERQUEIRA, Jean Robert BONAMI, Franck GODIARD, Fabian PILLET, Noureddine DRIRA, Néji GHARSALLAH, Tatiana VALLAEYS
11:20-11:40	Use of medicinal and edible plants in the Tormik Valley in Baltistan, Karakoram Range of Mountains causing rarity of species. Shujaul Mulk KHAN*, Zaheer ABBAS, Zahid ULLAH and Habib AHMAD

11:40-12:00	Phytochemical study of <i>Eryngium campestre</i> . MC. ABERKANE; S. SIFOUANE, A. DIBI, F.BITAM
12:20-12:40	Closing remarks
12:40:14:00	Lunch
ROOM B	Moderators: Regine CLAßEN-BOCKHOFF, Ferhat CELEP
09:00-09:20	Morphology, anatomy, palynology and mericarp micromorphology of the Turkish endemic <i>Lamium eriocephalum</i> (Lamiaceae) and their taxonomic implications. Zeynep ATALAY*, Ferhat CELEP, Bilgehan BİLGİLİ, Musa DOĞAN
09:20-09:40	Investigation of reproduction biology and ex-situ conservation of rare and threatened species of Colchis flora <i>Rhododendron smirnowii</i> Trautv. Nino MELİA*, Laura GABEDAVA, Lia KOBAKHIDZE
09:40-10:00	Rarity and endemism in flora of Chitral Pakistan. Haidar ALI*, M.QAISER, Habib AHMAD
10:00-10:20	In vitro propagation and <i>ex vitro</i> rooting of <i>Caralluma edulis</i> (Edgew.) Benth. & Hook. f.: A rare and endemic edible plant species of Indian Thar Desert Ashok Kumar PATEL*, N.S. SHEKHAWAT
10:20-10:40	Coffee break
ROOM B	Moderators: Mustafa YILMAZ, Hong KYUNG-NAK
10:40-11:00	Assessment of ecological condition of <i>Galanthus woronowii</i> Losin. and <i>Senecio platyphyllus</i> M. B. in Western Georgia N.GOGİNASHVİLİ*, Georgia N. CHKHAIDZE
11:00-11:20	Forest genomics for forest tree breeding and gene conservation. Esra Nurten YER*, Mehmet Cengiz BALOĞLU, Sezgin AYAN
11:20-11:40	A very threatened endemic taxon in Djurdjura Biosphere Reserve (Algeria): The black pine of the Maghreb (<i>Pinus nigra</i> Arn. subsp. <i>mauretanica</i>). Rachid MEDDOUR*, Ouahiba MEDDOUR-SAHAR
11:40-12:00	Distribution of <i>Pyrus</i> species across the Hindu Kush-Himalayn Region of Northern Pakistan. Mohammad ISLAM*, Habib AHMAD
12:00-12:20	Linkages between forest conservation and medicinal plants of Ayubia national park: prospective and constrains Rabia AFZA*, Mir AJAB
12:20-12:40	Go to Room A for closing remarks
12:40:14:00	Lunch

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ORAL PRESENTATIONS

(Listed in the order of Presentation in the Scientific Program)

20 April 2014: SUNDAY

OP1: TRACING RARE AND ENDEMIC PLANT SPECIES WITH DNA ANALYSIS TECHNIQUES

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There are numerous examples of disagreement among botanists on the taxonomic status of certain plant species. In many cases, legal protection for a rare plant population depends on its status as a species. The acceptance of isolated populations as separate species depends on the underlying species concept; a topic that is especially tricky in plants, because of widespread hybridization with fertile offspring. DNA analysis techniques have long promised to provide objective, measurable traits that may finally settle such disputes. Here we review the use of mainly chloroplast DNA variation as a means to delineate species, subspecies, (geographical) 'races', 'ecotypes' and populations. While in the past, markers suitable for simple detection systems have prevailed, currently there is a split between the 'barcoding' camp that concentrates efforts on (mass-) sequencing pre-defined DNA loci on the chloroplast, and the 'whole chloroplast' or 'chloroplast genomics' camp that searches for methods suitable for analysing entire chloroplast genomes in many plants. A third stream may be called 'the SNPers' who first use genomics to identify polymorphic single nucleotide polymorphisms (or SNPs), which are then analysed in high-throughput manner for many individuals in a second step. We will highlight the benefits of these approaches and give examples and make recommendations for the special case of the study of rare and endemic plants

Keywords: Rare endemics, DNA techniques, SNPs

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OP2: TOLERANCE TO BARK BEETLE DAMAGE IN *Picea orientalis*: MOLECULAR EVIDENCE

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Oriental spruce (*Picea orientalis*) is one of the major forest tree species in Turkey. It is endemic to the Northeastern Turkey and the Lower Caucasus. The species is a key component of many fragile forest ecosystems. For the last few decades, oriental spruce forests are affected by bark beetle (mainly *Ips typhographus*) infestation resulting in significant damage. Wide spread and intensive but costly pest control efforts are in place to contain the epidemic with limited success. In the midst of the epidemic, Temel et al. (2005) reported that unusual reddish barked spruce individuals were more tolerant to *I. typhographus* damage than common gray barked individuals in the same habitat. The current study was undertaken to compare reddish and gray barked spruce populations using SSR markers. A total of 20 trees were sampled from each bark color in Artvin, Turkey. Total DNA was extracted from fresh needle tissues and were screened with 15 SSR markers developed for other spruce species. Initial results indicate that there is a unique allele found only in reddish barked individuals. Complete results of the study will be presented at the symposium. Temel, F., T. Göktürk, Z. Ölmez, Y. Aksu 2005: Preferences and colors: Does *Ips typhographus* pick spruce individuals to infest by their bark color in Murgul-Artvin? Spruce Symposium, Karadeniz Technical University, Trabzon, Turkey. 20-22 October 2005. Proceedings, 1: 233-240. (in Turkish with English abstract)

Keywords: *Picea orientalis*, *Ips typhographus*, bark beetles, bark color, oriental spruce

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**OP3: GENETIC VARIATION OF EUROPEAN BEECH (*Fagus sylvatica*)
POPULATIONS IN TURKEY**

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Fagus orientalis Lipsky (Oriental beech) indigenously grows in the west from Balkans through Anatolia, to the east Caucasus, northern Iran and Crimea. In Turkey there is also natural distribution of *Fagus sylvatica* (European beech). The objective of this study was to determine the magnitude and pattern of genetic variation present in natural European beech populations by using microsatellite (SSR) markers developed for Fagaceae. In the study European beech samples collected from 4 different natural populations (Demirköy-Kadınkule, Dursunbey-Çamlık, Alaçam-Alaçam and Kalkım-Sarıot). In the populations observed heterozygosity changed between 0.33 and 0.20. Variation in the European beech populations are low by comparing to the Oriental beech populations.

Keywords: *Fagus sylvatica*, European beech, SSR.

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OP4: GENETIC STRUCTURES OF *Salix alba* AND *Salix excelsa* CLONE BANKS ASSESSED BY MICROSATELLITE DNA MARKERS

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The genus *Salix* L. is represented with more than 500 species in the world and 28 of species are found naturally in Turkey. This genus has been commonly used as bioenergy, phytoremediation and pharmacological production. Economically *Salix* species are used in preventing soil and wind erosion, in basket and fence making, paper production and also in recreation projects. *Salix* species are the most significant shrubs used in energy projects in the worldwide. Therefore; they are cultivated worldwide for the production of biomass and for environmental solutions. With the proposed study, it was aimed to provide information for efficient conservation, management and utilization of genetic resources of 2 most common economically valuable willow species (*S. alba* and *S. excelsa*) for breeding by using molecular diversity data. The major genetic resources of *Salix* for future plantations in Turkey consist of 74 clones (30 from *S. excelsa* and 44 from *S. alba*) which are located in the Behiçbey Nursery in Ankara. These clones were screened with 8 different nuclear SSR markers. The number of *S. alba* alleles ranged from 2 to 12 with an average of 7.75 alleles per locus. The observed heterozygosity ranged from 0.04 to 1.0, with an average of 0.52 per locus. The number of *S. excelsa* alleles ranged from 3 to 10 with an average of 6.50 alleles per locus. The observed heterozygosity ranged from 0.11 to 1.0, with an average of 0.50 per locus. Based on F_{IS} value, *S. excelsa* clones ($F_{IS} = 0.12$) have higher inbreeding than *S. alba* ($F_{IS} = 0.08$). The preliminary results suggest that to enrich the genetic composition of *Salix* clone banks, further sampling of clones from the natural ranges is needed.

Keywords: *Salix* sp., microsatellite marker, genetic diversity, conservation biology

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**OP5: DETERMINATION OF GENETIC VARIATION IN RARE ENDEMIC PLANT
*Verbascum calycosum***

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Verbascum calycosum Hauskkn. ex Murb. (*Scrophulariaceae*) is a rare endemic plant species having considerably narrow distribution in Erzincan region. This species were recorded as extinct (EX) in Turkish Plants Red Data Book, however, it was rediscovered from its original locality in 2002 and 2005 by different investigators. To date, no studies intended for conservation of this species available. Determination of genetic diversity levels and understanding reproduction systems are very important to develop conservation strategies for rare and endangered species. During the field survey between 2012-2013 two natural populations around Salihli-Kemaliye region with over 8000 individuals were detected. The genetic variation of 93 individuals from two populations was studied by using ISSR markers. Obtained results will provide crucial data to clarify genetic factors which may affect risk of extinction and also to make suggestions for the conservation of this species.

Keywords: *Verbascum calycosum*, rare endemic, genetic variation, ISSR

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OP6: CONSERVATION GENETICS AND GENOMICS OF FOREST TREES

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Genetic/genomic diversity provides the basis of conservation and sustainability of genetic resources of a species (whether rare, endemic or widely distributed) because it bestows evolutionary potential and raw material for adaptation, evolution and survival of species, populations and individuals, especially under changed environment, climate and disease conditions. Conservation of genetic diversity of keystone, rare and endemic species is of special importance, particularly for the stability and functioning of their ecosystems. Anthropogenic and natural disturbances, such as resource extraction, land clearing, habitat fragmentation, fires, climate and environment change, can significantly impact genetic diversity, population structure, breeding system and evolutionary processes, consequently impacting the fitness and evolutionary potential of plant populations. There is a critical need to understand inherent genetic/genomic diversity, population structure and evolutionary processes and genetic impacts of human and natural disturbances in populations of keystone, rare and endemic plant species in order to develop effective conservation genetic strategies. Genetics and genomics research and applications can provide excellent opportunities to address these essential needs. I will discuss how population and conservation genetics and genomics research and applications can assist us in understanding the genetic and genomic diversity, population structure, local adaptation and genetic impacts of human and natural disturbances in keystone forest tree species by presenting the highlights of our own research on several North American spruce (*Picea*) and pine (*Pinus*) species with regional and transcontinental distribution. I will also discuss implications of our research for conservation and sustainable management of the species' genetic resources

Keywords: Genetic diversity, genomic diversity, *Picea*, *Pinus*, conservation, management
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OP7: RESTORATION OF *Taxus cuspidata* AT DISTURBED SPOTS FOR FOREST GENETIC RESOURCES CONSERVATION IN MT. TAEBAEK, SOUTH KOREA

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Japanese yews (*Taxus cuspidata* Sieb. et Zucc.) grow at mountains over 1,000 meters above sea level in South Korea. Since 1960s, the number of yews has been rapidly decreased. The yew forest in Mt. Taebaek is the largest one and a local forest service has been intensively managing and protecting them since 1990s. However, saplings are extremely rare, survival rate of seedlings under the age of three is very low, and adults are very poor (Kim and Baek, 1998). The yews might be hard to be sustained just by natural regeneration and seedling establishment is very difficult in the disturbed spots due to trampling effects. The only effective way to solve the problem could be plantation of saplings with certain size. The local government operates three nurseries near Mt. Taebaek with around six hundred saplings. The saplings were 6 to 12 year-old and 1 to 3.5 meters in height. Their seed source should be Mt. Taebaek. But pollen contamination due to roadside yews (*T. cuspidata* var. *nana*) and some mistakes during seed management or seedling transferring in the nurseries have been concerned. Morphological traits or genomic analysis could not clearly distinguish Korean native yews from the roadside yews (Cope, 1998; Hao et al., 2008). Firstly, we chose 60 saplings based on their shape and conducted the genetic analysis. We assigned the saplings to their plausible origins by assignment analysis using 223 polymorphic AFLP markers. According to the amount of likelihood (Duchesne et al., 2002), we selected thirty-one candidates from the tested 60 saplings for genetic restoration of *Taxus cuspidata* at disturbed spots in Mt. Taebaek. Fifteen of them planted finally at the spots in the middle of October, 2010. We monitored them in 2011 and 2013.

Keywords: genetic restoration, *Taxus cuspidata*, assignment analysis, AFLP, artificial plantation

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OP8: RELICT POPULATIONS OF CAUCASIAN WINGNUT (*Pterocarya pterocarpa* (MICHX.) KUNTH) IN SOUTHERN TURKEY

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Caucasian Wingnut (*Pterocarya pterocarpa* (Michx.) Kunth) is a fast growing tree species with a large rounded crown. It is native to Turkey, Russia, Azerbaijan, Armenia, Georgia, Iran, and Ukraine. More than 10 small relict populations of the species are also found in southern Turkey including Kahramanmaraş, Gaziantep, Kilis, Hatay, Adiyaman, and Mersin provinces. The current statuses of the populations imply that these small distributions have been damaged, shortened in the length and narrowed in the width along with the streams for centuries. In around these relict populations, many events on streams such as irrigation, hydroelectric power plants, and recreation activities have still been threatening these small distributions. Any water cut from the streams, even for a couple of days, may be detrimental for the species since the species is very dependent on the running water. Therefore, conservation and restoration projects and studies should immediately be implemented without delay. The seeds of relict populations can be collected and stored in the seed banks. The seedlings of the species should be produced and used in the restoration projects of the natural populations. The species should also be introduced to the local administrations and the people for the awareness and embracement of the plant.

Keywords: *Pterocarya pterocarpa*, relict, conservation

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OP9: CONSERVATION STATUS OF THREATENED FLORA OF DISTRICT SHANGLA , PAKISTAN

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The present study documents three years of continuous field survey of district Shangla, Pakistan. Phytogeographically the area is located in Sino Japanese region, composed of highly rugged mountainous terrains. The conservation status of plants is determined according to IUCN 2001, Red Data List Categories and Criteria. A total of 31 localities were visited during various sessions of the years 2011-2013. Total of 1965 specimens were collected comprising of 512 taxa belonging to 107 families and 340 genera. Conservation status assessment is carried out for all these taxa. Among which a total of 17 taxa (3.174%) were endangered (E), 13 taxa (2.81%) were rare (R), 8 (1.54%) were vulnerable (VU), and 5 taxa (0.925%) were Data Deficient (DD). Unwise use of the floral resources, habitat destruction and alteration are the major threats to these rare taxa in the region. It is therefore suggested that both ex-situ and in-situ conservation measures should be adapted on urgent basis for the conservation of these plant resources. Similarly plant nurseries and botanic gardens should also be established for raising awareness and involvement of local people to make sure the sustainable use of these plant resources in their actual habitats.

Keywords: Conservation status, threatened, flora, District Shangla, Pakistan

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OP10: THE ENDEMIC PLANTS OF KYRENIA MOUNTAINS: THREATS AND CONSERVATION

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Kyrenia mountains run parallel to the northern coast of Cyprus island. The vegetation structure of Kyrenia mountain range site is unique and has a very high ecological value for biodiversity and nature conservation. The mountain range supports a diverse range of habitats including natural springs, valleys, cliffs, caves, high plateaus, and slopes exposed to different directions supporting high levels of endemism. It is known that there are a total of 47 endemic plant species along the Kyrenia mountain range, 13 of which are restricted to or closely associated with Kyrenia mountains. A striking feature of the Mediterranean flora concerns the high rates of narrow endemism within many regions. In this study the conservation status of seven plant species considered “rare” was studied from literature and field surveys and also the main threats were determined. Each of the seven plant species is endemic only to Kyrenia mountain range.

Keywords: Flora, endemic, rare species, Kyrenia Mountains, Cyprus

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OP11: REPRODUCTION BIOLOGY AND EX-SITU CONSERVATION OF TWO SPECIES OF THE GENUS *Iris* (Iridaceae) - *I. IBERICA* STEV. AND *I. CAUCAICA* STEV.

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The present work was aimed at studying the peculiarities of sexual reproduction, capacity for reproduction by seed and ex-situ conservation activities in species of genus *Iris* distributed in Georgia which have the following conservation status: *I. iberica* Stev. Endemic of Caucasus (EN); *I. caucasica* Stev. (EN). The species under investigation, belonging to different sections, are distributed in various natural habitats and are characterized by distinct biological properties. With the aim of establishing structural aspects of seed formation the following processes have been studied in target species: formation of generative structures, phenology of flowering, successive phases of development of male and female generative spheres; processes of pollination and fertilization, embryogenesis, endospermogenesis, processes of formation, development and differentiation of the embryo, which give an idea on potential and actual seed formation capacities of a particular species. For *I. iberica* actual seed forming capacity or number of formed seeds made 90-120, though potential seed forming capacity or number of formed ovules made 120-150. For *I. caucasica* actual seed forming capacity made 4-12 seeds, potential seed forming capacity made 10-16. For each particular target peculiarities of seed formation, development, maturation, dissemination, germination and sprouting have been established. Both species under study are characterized by dormant seeds, which retain viability for a long time. Under laboratory conditions seeds of *I. iberica* and *I. caucasica* remain viable for at least 3-5 years, germination rate is low. Ex-situ conservation activities have been undertaken: ex-situ collections of seedlings of target species are established on the experimental plot of the Department of Plant Conservation of the National Botanical Garden of Georgia and seed bank created. Seeds are deposited at the Caucasus Regional Seed Bank and the duplicates and herbarium vouchers sent to the Millennium Seed Bank of the Royal Botanic Gardens, Kew.

Keywords: seed reproduction, germination, seed bank, conservation

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OP12: CURRENT SCENARIO AND BIODIVERSITY LOSS SPECIALLY RARE AND ENDEMIC FLORA OF PAKISTAN

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Biodiversity loss is global issue and reason of grief concern. Health of any environment can be analyzed by its richness of biodiversity. Endemic and rare flora has narrow ecological amplitude, while according to rough estimate about 400 plants species are native to Pakistan. The diversity is continuously disrupting and decreasing, due to habitat loss and degradation, over exploitation and unsustainable use of the resources. Beside these, the climate change and other natural disasters e.g. floods, earthquake, melting of glaciers etc, also have role in depleting biodiversity. This paper communicates measures for safeguarding and decreasing threats to the extinction of biodiversity.

Keywords: Rare, endemic, Pakistan

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OP13: INCREASING THE ECONOMIC BENEFIT OF HIGH VALUE MEDICINAL AND AROMATIC PLANTS TO PAKISTANI COMMUNITIES: AN ANALYSIS OF CURRENT PRACTICES

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This study examined opportunities to maximize farm income through introduction of high value medicinal and aromatic plants (MAPs) in the war-stricken district of Swat. The hypothesis is that establishment of ex-situ experimental production plots will lead to the development of skills in horticultural production and marketing among people in the valley and help rebuild commercial connections between this region and the rest of Pakistan. The project involves a substantial agricultural extension component with farmers in three villages. The project has covered a range of interventions such as local awareness campaigns, capacity-building training, and community mobilization for conservation of threatened species, formation of MAPs. Producer Associations who are directly linked to big buyers for maximizing their net income. Moreover, the project has also established demonstration plots of the selected high value MAPs for economic analysis/feasibility (in terms of cost comparisons/opportunity cost between cultivation of cereal/cash crops and the selected high value MAPs and regular monitoring and evaluation of the adoption by farmers of improved agricultural practices. Additional emphasis has been placed on developing reliable marketing channels. The study has incorporated evaluation of its performance in introducing standardized production technology and appropriate post-harvest management, which represent the prime 'engines of growth' for the local economy. These strategic economic development areas are entirely based upon, and closely interlinked, with the management and conservation practices of high value MAPs, and intact landscapes.

Keywords: Medicinal plants, marketing, production, collectors, value chain analysis, conservation.

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21 April 2014: MONDAY

**OP14: MANAGING WILDFIRE RISK FOR BIODIVERSITY CONSERVATION:
CASE STUDIES FROM THE US AND MEDITERRANEAN REGION**

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The growing incidence of large fires globally over the past decade has led to extensive research on decision support tools for wildfire risk management. Wildfire simulation models are now being widely used to describe wildfire topology on complex landscapes, and to analyze potential wildfire events in terms of timing, location, intensity, and impacts. Model outputs are used to develop risk assessments and mitigation strategies for human and ecological values threatened by wildfire. Risk assessments are a key input to conservation strategies for rare, fire-sensitive species in terms of identifying specific critical habitat areas that are less likely to be impacted by fire, and also to locate fuel treatments to facilitate fire protection efforts around endemic populations. In this talk, a number of wildfire risk management case studies will be presented from the US and Mediterranean region to demonstrate wildfire modeling for the specific problem of protecting rare and endemic species. The talk will contrast the use of wildfire risk assessment tools to design conservation strategies for fire-adapted versus fire-sensitive plant and animal species. A number of specific wildfire modeling and geospatial analysis tools will also be discussed in terms of their functionality for risk assessments.

Keywords:wildfire risk, wildfire simulation, biodiversity conservation

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**OP15: WILDFIRE RISK SIMULATION METHODS AND APPLICATION TO
PROTECTED AREA MANAGEMENT**

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Research has shown how wildfire simulation modeling can be used to conduct actuarial risk analysis for protected wildland areas. The modeling methodology consists of Monte Carlo generation of weather sequences and ignitions which produce fire growth patterns across complex landscapes. The overlapping "footprints" of fires after 10-50,000 years of simulation yield estimates of burn probability and fire size distributions (numbers by size class). Simulations also produce fireline intensity (energy release rate) distributions at each pixel derived from variation in weather, fire edge orientation, and fuel type. By associating each intensity level with its impact on an environmental asset, such as habitat suitability or animal population, expectations of wildfire impact can be estimated across the landscape or by any spatial stratum. Effects of changing land use or land cover on these environmental impacts can be estimated by editing the spatial input data on vegetation. Examples of using this methodology will be presented for North America and Europe.

Keywords: Wildfire, risk analysis, simulation

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**OP16: THE EFFECTS OF FIRE ON TURKISH RED PINE (*Pinus brutia* ten.)
FOREST VEGETATION AND INDICATIONS FOR POST-FIRE RESTORATION**

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Hundreds of forest fires occur in each year in Turkey like the other parts of Mediterranean Basin and thousands hectares of forests are affected by them. They most intensively appear in the Turkish red pine (*Pinus brutia* Ten.) forests, which is one of the characteristic ecosystems of Eastern Mediterranean Basin. Turkish red pine forests with about an area of five million hectares in Turkey are fire prone ecosystems. They are resilient to fire due to their fire adaptive traits like the other Mediterranean type ecosystems. Turkish red pine forests can easily be regenerated after fire and floristically, ecologically and structurally reach the similar pre-fire conditions in time. This is a result of their floristic structures mainly formed by obligate resprouters and obligate seeders (soil and crown seed bank). Turkish red pine, as a tree species, also has fire adaptive characteristics specifically due to the thick cone scale and seed testa preventing the fire negative effects. So they can easily regenerate at the favorable regeneration conditions appearing after fire. But all of those mainly realize under a natural fire regime and it has essentially been changed today because of the human negative effects. Not only due to the ignition reasons but also their effects, fires show differences from their natural characteristics today. Those result in floristic, ecologic and structural changes in the ecosystems. For example, when a fire occurs earlier than the time of a sufficient seed bank that is required for post-fire regeneration, Turkish red pine would not be able to regenerate and the vegetation may convert to machia. This is crucial for post-fire management. For a favorable post-fire management, it is required that knowing the relationships between fire and vegetation and working by a good analyze of the post-fire ecologic conditions.

Keywords: Forest fire, *Pinus brutia*, vegetation, restoration

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OP17: DETERMINATION OF THE CURRENT STATUS OF ENDEMIC AND RARE TAXA IN MUĞLA FORESTRY REGIONAL DIRECTORATE

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The demands of certified products in forestry have been increasing in the world. Today you have to have certified products to enter some markets. In forestry certificate of “Forest Stewardship Council” (FSC) is one of the most common certificates. Muğla Regional Directorate of Forestry has planned to get FSC certificate to make their products more valuable. However, there is a necessity of monitoring endemic and rare plant species and impact of forestry practices on them for FSC certification. Therefore a project has been started to monitoring those species. Muğla Forestry Regional Directorate consists of Aydın and Muğla provinces. According to TUBIVES (Turkish Plants Data Service) records Muğla province has 1250 plant taxa, those of 274 are endemic. Aydın province has 561 taxa, those of 71 are endemic. Therefore, in Muğla Forestry Regional Directorate, there are totally 345 endemic and rare species. In this project, it is planned to identify current status of endemic and rare species in Muğla Forestry Regional Directorate’s area. For this purpose, a catalog which has photographs of species was prepared, delivered to the stakeholders and all Forest Regional Chiefs have been trained about endemic and rare species. After that they have been requested to identify endemic and rare species in their region and report to project team. After this project, current status of endemic and rare species in Muğla Forestry Regional Directorate will be determined. Then a scale and evaluation criteria will be developed. After evaluation of all species, localities to be monitored and protected for those species will be determined.

Keywords:Endemic species, rare species, forestry certificate, Muğla, Aydın

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OP18: ARCHITECTURE AND BREEDING SYSTEMS IN APIACEAE

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Members of the Apiaceae are easy to recognize by their white or yellow umbels. Many insects are attracted by the flat inflorescences promoting promiscuous pollination. Given that the plant is self fertile, which appears to be the rule as far as investigated, a high degree of self pollination should be expected. However, the opposite case is true. Apiaceae have many traits to avoid selfing. These are largely based on architecture, sex distribution and flowering sequence. Each plant produces umbels at the end of the main shoot (terminal umbel) and of branches of first, second and even higher orders (I, II, ...n). The single flower usually starts with the male stage (protandry). Flowering is simultaneous within each umbel order and sequential among the orders resulting in multicyclic dichogamy. This extreme form of phase separation renders the individual temporarily dioecious. It is an effective breeding system if the individuals stand in large populations and are frequently visited by flying insects guaranteeing that at each female flowering stage there is enough pollen around to enable cross fertilization. Pollen surplus is additionally increased by andromonoecy, i.e. the presence of hermaphrodite and (functionally) male flowers in the same individual. While the terminal umbel usually produces the highest percentage of fruits, the umbels of highest branch order are often completely male. Thus, the single individual is a pollen receptor first and a pollen donor at the end of anthesis. The degree of andromonoecy appears to be species-specific. However, manipulation experiments have shown that the repetitive umbel formation at different branch orders also allows plastic response to herbivory or any other damage. The talk aims to raise interest for the reproductive biology of the Apiaceae which are distributed in Turkey with so many interesting species.

Keywords: Apiaceae, reproductive biology, pollination

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**OP19: PRELIMINARY DATA OF REVISION OF THE GENUS *Lamium* L.
(Lamiaceae) IN TURKEY**

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Lamium L. is composed of nearly 40 species distributed extensively in Europe, eastern Asia, northern Africa, north of the Atlas mountains and Macaronesia. Its centre of diversity lies in the Irano-Turanian and the Mediterranean phytogeographic regions. *Lamium* species are used in official and traditional medicines in Anatolia, Europe and China, possessing antioxidant, anti-inflammatory, blood tonic, uterotonic, antiplasmodic, antiseptic, uterotonic, trauma, hypertension, chronic bronchitis, pharyngitis and etc. Moreover, some *Lamium* species are also grown in parks and gardens as ornamental plants. Most of the taxonomic problems in the genus arise from its unique biological characteristics. In general, the identification of *Lamium* species is easy, but the nomenclature of the names is exceedingly complicated. Although over 160 names have been described at species and infraspecific rank, only ca. 40 species are generally recognized. According to the latest monograph, and some molecular studies, the species number of the genus is now accepted as 24. Since 2012, as a part of a revision of the genus *Lamium* in Turkey, the authors have carried out extensive field studies and collected a large number of specimens to carry out a taxonomic revision of *Lamium* and solve existing taxonomic problems in Turkey, to determine distribution and the threat categories of the taxa, to construct a new infrageneric grouping, to determine ecological and phytogeographical properties of the taxa, to carry out some morphological, anatomical and palynological assessments for taxonomic reason and to understand the evolution of taxa. The objectives of this study are to give an outline of taxonomy, ecology, anatomy and micromorphology of the genus based on our preliminary data.

Keywords: *Lamium*, revision, morphology, micromorphology, Turkey

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OP20: NOTES ON ENDEMIC *Aristolochia hirta* L. COMPLEX

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The genus *Aristolochia* has a limited distribution in the temperate areas of the northern hemisphere and is represented by up to 550 species worldwide. An interesting diversity within the *Aristolochia* genus is being discovered in the Mediterranean basin, especially in southern and western Anatolia, which is a specific mainland representing a diversity hotspot for the genus *Aristolochia*. Today, 27 species are known from Turkey, of which 15 are endemic and were largely described after the 1960s. “*Aristolochia hirta* complex” is phylogenetically consisting of seven endemic species (*A. guichardii* Davis & Khan, *A. poluninii* Davis & Khan, *A. hirta* L., *A. incisa* Duchartre, *A. auricularia* Boiss, *A. baseri* Malyer & Erken and *A. adalica* Tosunoglu & Malyer, which are mostly distributed on the west and southwest part of Anatolia. Although phylogenetically being together with these species; *A. hirta* is mostly has morphological similarities with northern and eastern *Aristolochia* species. Previous works and suggestions on “*Aristolochia hirta* complex” were mostly about the north Aegean and Greek populations of *A. hirta* and the similarity with *A. bodamae* Dingler, which is still an unresolved problem today. On the other hand, because of morphological descriptions made by some authors, *A. hirta* comprising nearly all east Mediterranean species which have big flowers, U curved tubes and ovate to deltoid leaves of the genus. The combination of non-stable characters and large variation within the species leads to great difficulty in resolving identification problems of this complex. Some extended descriptions in the Flora of Turkey & East Aegean Islands and Flora Hellenica on some species, may lead to false identifications, which comprising *A. hirta* with certain other species. This risk of wrong identification with dried material necessitates studying this genus on living populations, including determining the population borders and variations of the species. Due to the lack of field experiments on living populations; many questions and identification problems remain.

Keywords: *Aristolochia*, taxonomy, Turkey

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**OP21: PHYLOGENETIC DIFFERENTIATION OF *Triticum* AND *Aegilops* SPECIES
BY ATR-FTIR SPECTROSCOPY**

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Triticum and *Aegilops* species belong to the Magnoliophyta division of the plant kingdom, under the Poaceae family. They display morphologically common traits and there is great disagreement at taxonomic ranking and so far at least 8 different classification systems were proposed by various authors within the last century. Within the last decade, accumulation of an increasing number of molecular genetic data (analysis of nuclear, chloroplast and mitochondrial genes) provided assistance to clarify the problems inherent in wheat taxonomy. However majority of these approaches are not only cumbersome but expensive and environmentally unfriendly. The study in concern aims to make a phylogenetic differentiation of 8 *Aegilops* and 4 *Triticum* species by using a practical and low-cost technique: Attenuated Total Reflection - Fourier Transform Infrared (ATR-FTIR) Spectroscopy. The Cluster and Principal Component Analysis results of the lignin band (1525-1505 cm⁻¹) showed that the genera of which the species belonging to can be differentiated by using ATR-FTIR spectroscopy. When the results of the whole spectral region (4000-650 cm⁻¹) are concerned, the aforementioned analyses revealed a clear differentiation of the species according to their genomic commonness. These results indicated that ATR-FTIR spectroscopy is a practical and low cost technique to phylogenetically differentiate wheat species and the data obtained can be used to clarify problems associated with wheat classification.

Keywords: *Triticum*, *Aegilops*, ATR-FTIR, phylogeny,

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OP22: POLYMORPHISM IN SEED ENDOSPERM PROTEINS (Gliadins and Glutenins) OF TURKISH CULTIVATED EINKORN WHEAT (*Triticum monococcum* ssp. *monococcum*) LANDRACES

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The genetic diversity of high-molecular-weight (HMW) glutenin subunits and gliadin proteins in 10 landrace populations of cultivated einkorn wheat, originating from Turkey, was investigated using sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE) and ammonium lactic acid polyacrylamide gel electrophoresis (A-PAGE). For glutenins, the mean number of alleles (na), the mean number of effective alleles (nea), the mean value of genetic diversity (He) and the mean value of average genetic diversity (He_av) were detected as 3.50, 2.98, 0.65 and 0.28 respectively. The observed genetic differentiation (FST) and gene flow (Nm) values between populations were 0.57 and 0.19 respectively. For gliadins, the mean number of alleles (na), the mean number of effective alleles (nea), the mean value of total genetic diversity (Ht) and the genetic diversity (HS) within population were detected as 2.00, 1.21, 0.17 and 0.15 respectively. The observed genetic differentiation (GST) and gene flow (Nm) values between populations were 0.08 and 6.15 respectively. Statistical analysis of Pearson's correlation, multiple regressions and principal component analysis indicated that eco-geographical variables have a significant effect on HMW-glutenins and gliadins diversity. Considering the high number of proteins and genetic variation, and increased interest in organic products, the farming of einkorn wheat should be boosted and conservation of germplasm in landraces should be maintained as important genetic resources. The landraces germplasm should be conserved for future crop improvement processes.

Keywords: cultivated einkorn wheat, *Triticum monococcum* L. ssp. *monococcum*, genetic variation, high-molecular weight (HMW) glutenin subunits, gliadins

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OP23: MOLECULAR PHYLOGENY OF *Triticum* AND *Aegilops* GENERA BASED ON COMPLETE SEQUENCES OF ITS rDNA GENE

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Triticeae (*Poaceae*) family with 330 species contains important cereal crops and taxonomically complex. Molecular information has recently provided the basis for phylogenetic construction in grasses at the subfamily and lower levels. In the present study, phylogenetic relationships among *Triticum* (12 genotypes from 4 species) and *Aegilops* (24 genotypes from 8 species) genera were investigated by using complete sequences of ITS (internal transcribed spacer) rDNA gene. Ribosomal RNA genes (rDNA) consist of transcribed regions (18S, 5.8S and 26S rRNAs) and non-transcribed spacer (NTS) regions. In the transcribed region, internal transcribed spacers (ITS) are found on either side of 5.8S rRNA gene and are called as ITS1 and ITS2. The length of the entire ITS region of *Triticum* species varied from 602 (*T. dicoccon* and *T. spelta*) to 603 (*T. monococcum*, *T. boeoticum*) nucleotides, while it was 602 nucleotides for all used *Aegilops* species. No variation was there within the 5.8S subunit region among species used in this study, but almost similar number of variations were observed in ITS1 (17 substitutions; 2 indels) and ITS2 subunits (19 substitutions; 1 indel). Although twice the number of *Aegilops* samples were sequenced when compared to *Triticum* samples, more substitutions were observed in ITS DNA sequences of diploid *Triticum* specimens. *Aegilops speltoides* (BB) and its varieties were separated from other *Aegilops* species by constituting clade B with polyploid *T. aestivum* (BBAADD), *T. spelta* (BBAADD) and *T. dicoccon* (BBAA). On the other hand, all other *Aegilops* species were clustered together and formed the Clade C due to the commonality of C (U) genome among them. In last clade (clade A) of constructed tree, diploid *T. monococcum* (AA), *T. boeoticum* (AA) and *T. urartu* (AA) were separated from polyploid *T. dicoccon*, *T. aestivum* and *T. spelta* due with the presence of twenty-one substitutions. The constructed phylogenetic tree demonstrated similar phylogenetic relationships with the previous study including DNA sequences of cpDNA *matK* region.

Keywords: *Aegilops*, evolution, ITS, phylogeny, *Triticum*

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OP24: PHYLOGENETIC RELATIONSHIP OF SIX *Astragalus* SECTIONS BASED ON NON-CODING *trn* REGIONS OF CHLOROPLAST GENOME

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Fabaceae is the third largest family of flowering plants with about 730 genera and more than 19400 species. This family comprises many species and varieties that are consumed as food and used to produce fiber, oil, timber, various chemicals and medicines. *Astragalus*, belonging to the legume family *Fabaceae*, subfamily *Faboideae*, is a large genus with about 3,000 species of herbs and small shrubs in Northern Hemisphere. The genus is native to temperate regions. The aim of this study is to revise *Macrophyllum*, *Hymenostegis*, *Poterium*, *Megalocystis*, *Halicacabus* and *Hymenocoleus* sections of genus *Astragalus* naturally found in Turkey using non-coding *trn* regions of the chloroplast DNA. The preliminary results including 24 species from these 6 sections using the DNA sequences of *trnL-trnF* and *trnV* intergenic spacer of cpDNA. According to constructed phylogenetic tree with bootstrap test of phylogeny analysis, *Poterium* section was formed a distinct group from other sections while *Hymenocoleus* and *Megalocystis* sections were closer to each other than other 3 sections which were separated from *Halicacabus* section. Furthermore, *Macrophyllum* and *Hymenostegis* sections were distinctly separated from the *Hymenocoleus*, *Megalocystis* and *Halicacabus* main groups in the phylogenetic tree. Further data collection is continued to revise the *Astragalus* sections in Turkey with respect to *trnL-F* and *V* regions of chloroplast genome.

Keywords: *Astragalus*, non-coding *trn* regions, chloroplast DNA, phylogenetic relationship.

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**OP25: DIVERSITY OF SOME QUANTITATIVE CHARACTERS OF
ORIENTAL SWEETGUM (*Liquidambar orientalis* Mill.)**

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Sweetgum tree seeds were collected from 19-27 trees of 9 sweetgum population (Bozdağ, Çetibeli, Değirmenyanı, Günlükbaşı, Günnücek, Kıyra, Köyceğiz, Yatağan, Yılanlı) that have the highest genetic diversity determined by applying molecular markers found in the sweetgum distribution area. With these seeds, a 25 – block -progeny trial was established with 223 families in Muğla Regional Forestry Directorate, Muğla Forestry Directorate, Gökova Forestry Chiefancy in 2009. In this trial single tree plot arrangement and randomized block design were conducted. In the trial, height at establishment, first- year bottom diameter, and height, and the number of branches and second year bottom diameter, and height, and the number of branches were measured. In the assessments height at establishment was placed in the model as covariate. In all characters, differences between populations were found statistically significant. When looking into different groups Bozdağ population which has the highest elevation (1100 m) and Yatağan population which has a peripheral distribution were found distinct from the other populations. The populations that have optimal distributions were found in closer groups. Genetic correlations and phenotypic correlations among characters were found. Although genetic correlations between the first and the second year of the same characters were found high correlations between characters were low. Phenotypic correlations were found medium and low. The genetic similarity dendrogram created with molecular markers and the genetic similarity dendrogram created with quantitative characters did not correlate with one another. According to preliminary results the genetic similarity dendrogram created with quantitative characters was found more consistent with geographical conditions and climatic characteristics.

Keywords: Sweetgum (*Liquidambar orientalis* Mill.), phenotypic correlations, molecular markers, quantitative characters, similarity dendrogram

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**OP26: PHYLOGENETIC RELATIONSHIPS OF SOME TURKISH *Salix* SPECIES
INFERRED FROM *matK* SEQUENCE DATA**

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The genus *Salix* L. is represented by more than 500 species in the world. Of these, 28 species are naturally found in Turkey. This genus has been commonly used as biomass production for energy, phytoremediation and pharmacological products. The traditional methods for identifying the species based on morphology are not sufficient to classify them due to hybridization, reproductive isolation, and polyploidy. The objective of the study is to reveal the phylogenetic relationships of native willow species in Turkey by studying the evolutionary conserved regions of chloroplast genome. The sequence data were obtained from chloroplast-encoded *matK* region of *Salix* species (14 species). The phylogenetic analyses were performed by using UPGMA methods. Preliminary results obtained by using *matK* sequences are largely consistent with morphological data. The analysis of the sequences produced two well-supported groups. The first group is composed of 6 species (subgenus *Salix*) and the second one is composed of 8 species (subgenus *Vetrix*).

Keywords: Salicaceae, *Salix* spp. , *matK*, phylogeny, evolution

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OP27: COMPARISON OF PHOTOSYNTHETIC EFFICIENCIES OF ENDEMIC AND COMMON *Centaurea* SPECIES UNDER SALT AND DROUGHT STRESSES

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Environmental stresses such as salt and drought adversely affect plant growth and development either cosmopolit/common or endemic plants. The aim of this study was carried out to prove the differences between common and endemic *Centaurea* (*Centaurea depressa* Bieb. and *Centaurea tchihatcheffii* Fisch. Et Mey.) species under salt and drought stress conditions by polyphasic chlorophyll a fluorescence. Seeds of species were applied 100 ppm gibberellic acid to accelerate their germination. Then they were planted to pots including perlite and soil mixture. The experiment was performed in controlled climate room at 25±2°C, with 16 h daylength and with a relative humidity of 50±5%. Seedlings were irrigated regularly every two days with ½ Hoagland solutions. Seedlings with 10 leaves were subjected to salt (200 mM NaCl) and drought stresses for 10 days followed by recovery period for 7 days. The polyphasic chlorophyll a fluorescence was used to evaluate photosynthetic activity of species at the end of the salt and drought stresses, and the recovery period. The *C. tchihatcheffii* exhibited better photosynthetic performance than *C. depressa* under stress condition and recovery period. *Centaurea* species were adversely affected from drought much more than salt stress. Stress treatments especially drought stress in *C. depressa* caused to disappear I-P phase of fluorescence transient. Stress treatments negatively influenced total performance index (PI_{tot}) is the most sensitive parameter of the JIP-test because it incorporates several parameters that are evaluated from the fluorescence transient OJIP and is a measure the performance up to the PSI end electron acceptors, especially under drought in *C. depressa*. Besides, stress treatments changed energy fluxes on membrane and leaf models of species. As a result, *C. tchihatcheffii* recovered from stress effects, while *C. depressa* became worse at the recovery period after drought treatment.

Keywords: *Centaurea*, Polyphasic Chlorophyll a Fluorescence, drought, endemic, OJIP, salt stress

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**OP28: GENETIC CONTROL OF CELLULOSE, LIGNIN AND GLUCOSE
CONTENTS IN EUROPEAN BLACK POPLAR (*Populus nigra* L.) POPULATIONS
FROM TURKEY**

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Populus nigra L. are considered as one of the most economically significant forest trees with respect to production of wood, biomass, timber, pulp, paper and other wood-based products, besides its ecological and evolutionary importance. While wood quality, pulp mechanical strength, and biomass are directly associated with high cellulose content, lignin emerges as an undesirable polymer for both pulp and biofuel manufacturing industries. To estimate the contents of the main cell wall polymers, cellulose and lignin, and total D-glucose content of wood cell, and also their proportion to each other, we established a large collection of biological samples from one year old branches of poplar trees (285 clones x 3 replicates x 2 ramets) which were grown in Behiçbey Nursery in Ankara. Additionally, five commercially registered clones and six foreign clones were included to the study to make comparison. The average mean values of cellulose, lignin and glucose content were calculated as 21.8 ± 16.29 $\mu\text{g/ml}$, 23 ± 4.64 $\mu\text{g/ml}$, and 35 ± 9.71 $\mu\text{g/ml}$, respectively. However, particular clones were detected with extraordinary high values for these. The components of the total variance among clones within regions were 37.80 %, 24.96 %, and 57.79 % for cellulose, lignin and glucose, respectively and clearly attributed to importance of clonal selection. Positive correlations were observed between cellulose and height ($r = .22$; $p < .01$), cellulose and diameter ($r = .23$; $p < .01$) and also between lignin and glucose ($r = .31$, $p < .01$). On the other hand, negative correlation was detected between lignin and diameter ($r = -.121$; $p < .05$) as expected. The study by choosing the superior and eliminating the inferior clones pave the way for future investments and applicable new poplar breeding programs.

Keywords: *Populus*, poplar, cellulose, lignin, glucose, genetic variation

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OP29: SEASONAL CHANGES OF COLD-RELATED ANTIOXIDANT ENZYME ACTIVITIES IN BLACK POPLAR (*Populus nigra*) INDIVIDUALS

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Poplar is an important crop to understand molecular processes of growth, development and responses to environmental stimuli due to model tree status in forestry with fully sequenced genome. Low temperature is one of the major environmental constraint which affects the distribution, growth and development of plants. A diverse genetic variation lies in the natural stands of black poplars in Turkey which makes them ideal materials to indicate the mechanisms of cold tolerance. Black poplars are widely distributed throughout the whole country due to their strong adaptabilities in spite of the stress conditions. In this study, seasonal changes in the activities of antioxidant enzymes such as glutathione reductase (GR), ascorbate peroxidase (APX), dehydroascorbate reductase (DHAR) and catalase (CAT) were examined in black poplar individuals. In this context, cambium tissues were sampled at monthly intervals from December 2010 to April 2012 and antioxidant enzyme activities were determined. It was found that the activities of GR, APX and DHAR showed very similar trend which increased with low air temperatures in winter months. Then the activities decreased simultaneously with increase of air temperature during remaining months. The seasonal variations of CAT activity was different from the other enzymes. Periodic changes in the basic antioxidant enzyme activities in a given growing season may be used for further understanding of the cold acclimation phenomenon and adaptation strategies in black poplars. New black poplar individuals that indicated better resistance to frost damages and better growth performance were determined with this study.

Keywords: *Populus nigra*, cold, low temperature, antioxidant enzymes

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OP30: EFFECT OF CONDITIONS AND PERIODS OF CONSERVATION IN GENE BANK ON GERMINATION AND VIABILITY OF *Acacia tortilis* Spp. *tortilis* AND *Acacia tortilis* Spp. *raddiana*

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In Egyptian deserts, *Acacia tortilis* trees play an important role for biodiversity and Bedouins population. Where used as a source of animal fodder, timber, fuel wood, charcoal, gums and other products as well as contributing to soil stabilization sand dunes. This work aimed to study effect of storage conditions and storage periods of preservation in gene bank on germinability and viability of two wild economic native species, which were collected from the Egyptian deserts (Wadi Tekuila – Gabel Elba – Red Sea) and (Gabel El-Halal –North Sinai, Sinai). In this area *Acacia tortilis*, *raddiana* trees shown high densities it become forest wadis. *Acacia* plants exposed a problem in natural habitat appears in the insects feed on seeds and inability to germinate normally because they contain the type of dormancy. Best value of germination percentage (45%) recorded when seeds of *Acacia tortilis* sub species. *raddiana* from Elba, were conserved in base room (-22 oC) for 24 months.

Keywords: Egyptian deserts, *Acacia tortilis*, Gene Bank, germination percentage

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**OP31: AN APPROACH TO THE PHYLOGENY OF GENUS *Centaurea* L. WHEREBY
cpDNA SEQUENCES OF NON-CODING REGION OF *trnL* (UAA) INTRON**

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The genus *Centaurea* L. the member of *Asteraceae* family, is one of the three largest genera distributed mainly in Mediterranean. It is approximately composed of 700 species. However, this number is changes from 400 to 700 due to the taxonomic confusion among the species of *Centaurea*. The taxonomic position of the taxa may varied according to the new systematic relationships and combinations within the genus. The objective of this study was to find out the phylogenetic relationships in the genus *Centaurea* L. by means of the sequence differences in *trnL* (UAA) intron in cpDNA. Universal primers were used to amplify and sequence this region from 12 taxa, some of endemic to Turkey. Sequencing was performed using the ABI 3100 Genetic Analyzer. DNA sequences were aligned by the multiple sequence alignment program, ClustalW. Obtained data was evaluated using the software MEGA 5.1. Findings from this research will be discussed in this presentation. The results are expected to contribute to our understanding of how allelic differences in the *trnL* (UAA) intron causes phylogenetic variation in the genus *Centaurea* L.

Keywords: Phylogeny, *Centaurea* L., cpDNA,
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**OP32: SOMATIC EMBRYOGENESIS AND SYNTHETIC SEED PRODUCTION IN
Amsonia orientalis DECNE.**

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Amsonia orientalis Decne. is a rare important medicinal plant whose natural populations are threatened by extinction. Natural distribution of *A. orientalis* is limited only within northwest Turkey and northeast Greece. In the present study, it was aimed to produce synthetic seeds via somatic embryogenesis from leaf explants of *A. orientalis*. Leaf explants were cultured in Murashige & Skoog (MS) medium containing various plant growth regulators at different concentrations. The medium containing 2.0 mg/l 2,4,5-T was found to be the best for callus induction. Friable embryogenic callus was obtained from leaf explants. Somatic embryo formation was observed at 35.29% frequency. The somatic embryos at globular and torpedo stages were transferred to embryo growth medium. It was observed that the somatic embryos transferred to liquid culture were developed and matured better in liquid medium containing 10 µM ABA. The highest efficiency in embryo growth medium was observed from the medium containing 5.5% D-Mannitol. Somatic embryos were encapsulated with 3% (w/v) sodium alginate and 100 mM calcium chloride. Within this study, somatic embryogenesis using leaf explants and synthetic seed production in *A. orientalis* were achieved for the first time.

Keywords: 2,4,5-T, ABA, Blue star, synthetic seed, somatic embryogenesis

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OP33: THE ESSENTIAL OIL COMPOSITION AND ANTIOXIDANT ACTIVITY OF *Achillea* SPP GROWING IN SOUTH WEST OF IRAN

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The composition of essential oil isolated from *Achillea eriophora*, *Achillea millefolium*, *Achillea biebersteinii* and *Achillea tenuifolia* growing wild in south west of Iran, was analyzed by GC and GC-MS. *A. eriophora*, *A. millefolium* and *A. tenuifolia* essential oil were characterized by sabinene, 1, 8-cineole, α -bisabololoxide A, Apigenin-7-glucoside, terpinene-4-ol and α -pinene. The *A. biebersteinii* essential oil was characterized by sabinene, borneol, camphor, piperitone and α -pinene. Antioxidant activity was analyzed using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging and reducing power (the ability of oil to reduce iron +3) methods. Results indicated essential oil obtained from *A. eriophora*, *A. millefolium*, *A. tenuifolia* and *A. biebersteinii* exhibited a dose-dependent increase with a radical scavenging effect of 85.0 %, 82.0% , 82.0% and 64.0 % at 350 μ g/ml, which are close to the DPPH inhibition of the positive control BHT (88.0%) at the same concentration. It was shown that the *A. biebersteinii* essential oil exhibited the weakest antioxidant effects than BHT or other *Achillea* spp essential oils. In this study chamazulene, α -bisabolol, α -bisabololoxide and apigenin-7-glucoside percentage were higher in *A. eriophora*, *A. millefolium* and *A. tenuifolia* essential oil compared to *A. biebersteinii* essential oil and these compounds improved antioxidant capacity of *Achillea* spp.

Keywords: *Achillea* , essential oil, radical scavenging, DPPH.

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OP34: THE MEDICINAL USE OF THE ALGERIAN PLANT *Pallenis spinosa* AND ITS CHEMICAL INVESTIGATION

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The Mediterranean species *Pallenis spinosa* (L.) Cass. is one from species of plants were catalogued for use in human medicine. The flowery parts of *Pallenis spinosa* (L.) Cass. is used for the treatment of : Gastralgia, circulatory problems, contusion, injury, inflammation, mouth infections and respiratory problems [1,2]. The literature data showed a few studies of this plant and the main compounds are sesquiterpenes derivatives and flavonoids [3]. In the course to find other metabolites, we undertaken the phytochemical study of *Pallenis spinosa* which grows in Algeria. The extraction of the aerial parts with two solvents yielded two extracts: chloroform extract and butanol extract. The purification and the analysis spectroscopic resulted in the structure determination of two sterols: Stigmasterol-3-O- β -D-glucopyranoside-6'-O-Ester I and β -Sitosterol-3-O- β -D-glucopyranosyl II. The structures of these compounds were established by spectral data, including 1D, 2D NMR and mass spectroscopy.

Keywords: *Pallenis spinosa*, medicinal plant, Asteraceae, sterols

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OP35: PHYTOCHEMICAL COMPOSITION AND BIOLOGICAL ASSAYS OF THE AERIAL PARTS OF *Thymelaea hirsuta* ESSENTIAL OIL FROM TUNISIA

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The present study aimed to appraise the main constituents, antimicrobial and cytotoxic activities of the aerial parts of *Thymelaea hirsuta* essential oil isolated by the hydro-distillation. The essential oil was analyzed by GC-MS and bioassays were carried out. A total of twenty-two compounds, representing 98.46% of the oil, were identified and the analysis revealed that, the major components were Heptane (34.20%), followed by Germacrene D (15.66%), γ -Eudesmol (14.25%), Citronellyl formate (12.04%), trans-Caryophyllene (3.92%), δ -Cadinene (3.08%), and β -Bourbonene (2.93%). The antimicrobial activity of the oil was evaluated against eight bacterial and three fungal pathogenic strains. Gram-positive bacteria were noted to be more sensitive to the oil than gram-negative bacteria and yeasts. In vitro cytotoxicity evaluation against HeLa cell lines showed that the essential oil possessed moderate cytotoxicity on human tumor cells, with high IC₅₀ value of 175 μ g/mL. Overall, the results indicate that the *Thymelaea hirsuta* essential oil has a number of attractive properties that might open new promising opportunities for the control or prevention of a wide range of microbial infections and cancers with further investigation to determine its active components.

Keywords: *Thymelaea hirsuta*, essential oil, chemical composition, antimicrobial activity, cytotoxic activity

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**OP36: DETECTION OF TOMATO CHLOROTIC DWARF VIROID FROM
Pittosporum PLANTS**

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In Tunisia several viroids, smallest plant pathogen described so far, have been reported in fruit trees (grapevine, citrus, peach, almond, pear, fig, pomegranate, pistachio). In this work we analyzed ornamental plant from tree nurseries for viroid infection testing for viroid by S-polyacrylamide gel electrophoresis (1) and for pospiviroids by reverse transcriptase-PCR with universal pospiviroid primers Posp1-RE/FW. The 196-bp amplicons were cloned and sequenced. Sequence analysis showed the highest identity for all amplicons to both isolates of Tomato chlorotic dwarf viroid (TCDVd) in NCBI GenBank, Accession Nos. AF162131 and AY372399, from Canada and the United States, respectively. Additional RT-PCRs with the Posp1-RE/FW primers in opposite order and the semi-universal pospiviroid primers Vid-RE/FW (2) for one isolate. The amplification products were cloned, sequenced and followed by sequence analysis, confirming the identity as TCDVd. The isolate consisted of 359 nucleotides. A viroid was detected for the first time in symptomless *Pittosporum tobira* plants and identified as Tomato chlorotic dwarf viroid (TCDVd) based on an analysis of the complete genomic sequence. These *Pittosporum* plants are a likely source of inoculum for tomato or potato plants because TCDVd induces severe symptoms on these plants. The genomic sequence of this *Pittosporum* isolate from Tunisia shared high identity with petunia isolates from the Netherlands and United Kingdom. Phylogenetic analysis showed that all *Pittosporum* isolates from Tunisia formed a monophyletic clade. This study shows that *Pittosporum tobira* is a natural host of TCDVd. To our knowledge, this is the first report of TCDVd in Tunisia.

Keywords: viroid, ornamental plant, phylogeny, molecular variability.

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OP37: PHARMACOLOGICAL IMPORTANCE OF *Disocorea deltoidea* AND ITS CONSERVATION STATUS IN INDIAN HIMALAYA REGIONS

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The study of Himalayan medicinal plant diversity is a great challenge in front of plant scientists. The Indian Himalayas are the warehouses of valuable medicinal plant species that have pharmacological importance. Various threatened and endangered plant species are still surviving in the Himalayan regions. *Disocorea deltoidea* wall. ex. kunth a tuberous herbaceous perennial lianas, belonging to family *Dioscoreaceae* and considered critically endangered species according to red list of IUCN has been widely recorded in North-western Himalayan regions. Traditionally the plant has been used as an anti-rheumatic, anti-allergic and to treat ophthalmic disorders. The juice of the root tuber is also used in the treatment of roundworm. The plants are further used to alleviate constipation and also applicable in various disorders of the genitry organs and to cure asthma. The plant contains steroidal saponins, which can be converted into steroid hormones for use in medicine and as contraceptives. The tubers of the plant contain Diosgenin, which is a phytoestrogen and can be chemically converted into the hormone progesterone. Diosgenin is a basis for anti-fertility drugs such as the contraceptive pill, of cortisone and sex-hormones, such as testosterone and supplements are used by body builders to increase their testosterone levels and build muscle mass. The pharmaceutical companies are exploiting synthetic materials of these plants in their drug production and also the dietary supplement as natural ingredients, thus threatening the continued existence of these plants. The present review provides comprehensive information on chemical constituents, pharmacological importance, mechanisms of action, current research prospects and conservation status of the herb. The research also discusses the optimal and safe utilization of the herb for its sustainability in the region.

Keywords: Himalayas, medicinal plants, critically endangered species

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OP38: COMPARISON AND DISTRIBUTION OF BACTERIAL ENDOPHYTIC FLORA COMPOSITION OF THE BRITTLE LEAF DISEASE (Maladie de la Feuille Cassante: MFC) OF THE DATE PALM TREE (*Phoenix dactylifera* L.)

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The date palm tree *Phoenix dactylifera* L. is a major component of oasis ecosystem supporting human and also animal life in desertic conditions. Diseases are known to affect this typical Mediterranean tree for which well identified fungi and bacteria as causative etiologic agents have been previously characterized, but to date none viral agent was reported. Recently, a novel disease emerged from south Tunisian oases, progressing circularly from the Tozeur area, suggesting an epidemic propagation. Numerous investigations were up to date unsuccessful to identify the MCF etiological agent. Starting our approach right from the beginning, without any a priori hypothesis, we successively compared the cultivable and total endophytic bacterial (clone sequence based) flora from both roots and leaves issued from healthy and MCF-affected adult date palm trees. While the extensive analysis of over 29 isolates and 200 clones of bacterial flora, the comparative analysis of the distribution of the endophytic bacterial flora exhibited the complete disappearance of the plant selective effect on its flora existing in the healthy palm. Indeed bacterial flora distribution switched from a peaked (Poisson like distribution) in healthy palms to a Gaussian type distribution in MCF affected ones. In particular, we noted a significant decrease of the Bacilli, which were associated with healthy palms (root and leaf), and the complete disappearance of Rhizobium and Ensifer sp. population which constituted the major bacterial compartment of healthy palm roots.

Keywords: Palm date (*Phoenix dactylifera* L.), Bacterial endophyte, Brittle Leaf Disease (MFC), *Rhizobium*, *Bacillus*.

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OP39: USE OF MEDICINAL AND EDIBLE PLANTS IN THE TORMIK VALLEY IN BALTISTAN, KARAKORAM RANGE OF MOUNTAINS CAUSING RARITY OF SPECIES

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The Karakorum Range of mountains is one of the diverse habitat in the world. It's situated at the junction of Western and Central Asiatic regions of Tethyan Flora. The Tormik Valley in the Central Karakoram having notable phyto-cultural diversity is one of the floristically unexplored valleys. Ethnobotanical data were collected by undertaking ethnobotanical trips in the study area for seven months in summer 2011. People were interviewed about their traditional knowledge on the utilization of plants. Use Values of each plant species were calculated. Balti people consume 60 plant species in the region to fulfill their daily uses. Based upon their nature of usage these species were classified in different classes that is ethno medicinal, wild edible and cultural plants. A total of 26 species (26 genera & 26 families) were used to treat 11 different human ailments. Based upon habit of the species herbs constituted (88%) of the recorded species followed by trees (8%) and shrubs (4%). Recorded plants were also examined for the part used, route of administration and dosage to be taken. A total of 13 (21%) species distributed in 10 families and 13 genera were used as wild vegetables while 10 (12%) species belonging to 9 (0.15%) genera and 9 families were used as wild fruits. In addition several other indigenous uses of plants are also practiced among the local community. 32 species came under the category of other uses and were further classified in 11 different subcategories of uses i.e., thatching, fencing, beverages, evil repellent, cottage roof, forage, fuel wood, making agricultural tools, wool viewings tool polo sticks. Findings of this paper advocate the need of comprehensive research to ensure the conservation of precious cultural knowledge as well as valuable plant diversity in the region which is under the threat of rarity.

Keywords: Indigenous knowledge, medicinal plants, rarity, Tormik valley, Karakorum

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OP40: PHYTOCHEMICAL STUDY OF *Eryngium campestre*

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The use of plants in traditional medicine is very old and experiencing a renewed interest to the public. According to the World Health Organization (WHO), nearly 6377 species of plants are used in Africa, where over 400 medicinal plants, which constitute 90% of traditional medicine. In 2004, nearly 75% of Africa's population uses plants that surround it to heal, because it has no access to medicines called modern (Pousset, 1989). Knowing that a plant may contain thousands of different substances, one can realize the natural wealth of the plant kingdom. In the socio-economic context of developing countries, the study of plants may lead to the achievement of adequate therapeutic responses and low prices, joining a proven scientific efficacy and optimal cultural acceptability. In this context, we chose to study a species that belongs to a genus of great importance in traditional medicine. The genus *ERYNGIUM* belongs to the Apiaceae family. This work reports a study of the species *Eryngium Campestre*. Our investigation focused on the ethyl acetate extract of the aerial parts of plant. The phytochemical investigation have yielded interesting results. Four secondary metabolites have been characterized and are phenolic, flavonoic and steroidal compounds. These products were characterized by spectroscopic methods of analysis 1D NMR of proton and carbon, 2D NMR (COZY H-H, J-modulated HSQC, HMBC), IR and ESI mass spectrometry. - Isorhamnetine 3-O-rutinoside (Narcissine)- 3-O- β -D-glucopyranosyl Kaempferol; - Acide rosmarinique- β sytosterol.

Keywords: *Eryngium*, Campestre, rutinoside, glucopyranosyl, flavanoic

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OP41: MORPHOLOGY, ANATOMY, PALYNOLOGY AND MICROMORPHOLOGY OF THE TURKISH ENDEMIC *Lamium eriocephalum* (Lamiaceae) AND THEIR TAXONOMIC IMPLICATIONS

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Lamium L. is composed of nearly 40 species distributed extensively in Europe, eastern Asia, northern Africa, north of the Atlas mountains and Macaronesia. Its centre of diversity lies in the Irano-Turanian and the Mediterranean phytogeographic regions. Anatomy, morphology and palynology of *Lamium eriocephalum* have not been studied previously and also such investigations on *Lamium* species are rather limited. In this study, the anatomy, morphology, palynology and nutlet characteristics of endemic *Lamium eriocephalum* were studied in order to understand the usefulness of these characteristics for systematic purposes. *L. eriocephalum* is an endemic Mediterranean element which grows on stony, rocky places, on screes and on calcareous and igneous soils at an altitude of 1800-3700 m in the south part of Anatolia. Some anatomical characters such as number of vascular bundle, the distances of vascular bundles between the corners in the stem, the number of palisade and spongy parenchyma layer of the leaf blade, and the petiole anatomy provide information of taxonomical significance. Moreover, scanning electron microscopic survey of pollen grains and nutlets of the species are provided.

Keywords: *Lamium*, anatomy, micromorphology

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**OP42: INVESTIGATION OF REPRODUCTION BIOLOGY AND EX-SITU
CONSERVATION OF RARE AND THREATENED SPECIES OF COLCHIS FLORA
Rhododendron smirnowii TRAUTV**

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Rhododendron smirnowii Trautv is tertiary relict species with a very limited distribution range. It occurs in the middle mountain belt on the ranges of Pontic Mountains and its embranchments. The species was first reported from the gorge of river Chorokhi. This ornamental plant with beautiful blossoms became threatened as a result of anthropogenic stress. Investigation of reproduction biology of the species and of the capacity for sexual reproduction within its frames is of primary importance for the survival and protection of this or that species. As only sexual reproduction provides survival of populations of wild grown species, we consecutively studied seed formation processes of the target species. Series of deviations taking place while formation of female and male generative spheres do not affect significantly the process of seed formation and the plant produces quite great number of filled seeds. The formed seeds were tested on productivity, viability and germinability. The 70% of seeds have revealed rapid development rate. Seeds are of good quality guaranteeing the possibility of sexual reproduction of the species under study. *Ex-situ* works were carried out for the *in-situ* re-introduction of the species in case of need.

Keywords: *Rhododendron smirnowii*, reproduction biology, seed, germination, ex-situ conservation.

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OP43: RARITY AND ENDEMISM IN FLORA OF CHITRAL PAKISTAN

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The total number of endemic taxa for Pakistan is c.400, among which the Sino-Japanese region of Kashmir has 38 taxa (10.21%) and North Baluchistan has 35 taxa (9.4%), whereas Chitral has the highest number of endemics i.e. 67 (16.75%) and is the most important region in this context. This high rate of endemism can be explained due to its unique topography, the long isolation of the valley as a result of snow capped mountains all around and location near the three famous mountainous ranges i.e. Himalaya, Karakorum and Hindu Kush. A total of 76 taxa are reported as exclusively endemic to Chitral. But as a result of our three years continuous field studies we could collect only 67 taxa. Beside this there are 60 taxa which are endemic to Pakistan but are also found in Chitral. A total of 46 taxa, which are restricted to Central Asia, Kashmir, Afghanistan or Iran are also found in Chitral. These rare and endemic plants are more prone to the process of extinction because their geographic distributions are very restricted. On the other hand any anthropogenic interventions in the habitat of these taxa can also cause rapid extinction.

Keywords: Rare, Endemic, Conservation status, threatened, flora, district Chitral, Pakistan.

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OP44: *In vitro* PROPAGATION AND *ex vitro* ROOTING OF *Caralluma edulis* (EDGEW.) BENTH. & HOOK. F.: A RARE AND ENDEMIC EDIBLE PLANT SPECIES OF INDIAN THAR DESERT

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Caralluma edulis (Edgew.) Benth. & Hook. f., (family Asclepiadaceae), is an edible and nutraceutically important plant of the extreme arid regions of Indian Thar desert. Anthropogenic activities on established sand dunes, habitat destruction and harvesting/grazing of complete plant prior to reproductive maturity restrict its propagation by natural means. Though it is categorized as endangered plant, there is need for revision of its status as this species can be spotted rarely in its habitat. There is also need for development of non-conventional methods for propagation and conservation of *C. edulis*. Therefore, *in vitro* methods are good alternative for multiplication, propagation and germplasm conservation of this nutraceutically important plant. We used nodal segments as explant for culture initiation. Murashige and Skoog (1962) medium containing 6-benzyladenine (BA) (2.0 mg l⁻¹) + additives proved optimum for axillary shoot induction and produced 3-4 shoots. Shoots were amplified by repetitive transfer of original explant and by subculturing of *in vitro* raised shoots on various concentrations of cytokinins [BA and Kinetin (Kn)] alone and in combination with auxin [α -naphthaleneacetic acid (NAA)]. A high rate (35.30 \pm 1.55 per culture vessel) of shoot multiplication was achieved on MS medium fortified with 0.5 mg l⁻¹ BA + 0.5 mg l⁻¹ Kn + 0.1 mg l⁻¹ NAA and additives. *In vitro* produced shoots rooted *in vitro* as well as *ex vitro*. Half strength MS medium containing 1.5 mg l⁻¹ indole-3-butyric acid (IBA) was optimal for *in vitro* root induction. More than 95% shoots were rooted *ex vitro*, when *in vitro* raised shoots were treated with IBA (300 mg l⁻¹) for 4 min. Rooted plantlets by both methods were hardened under different conditions of humidity and temperature in the greenhouse. This protocol can be used for large scale propagation and conservation of germplasm of this edible, endemic and endangered plant.

Keywords: *In vitro* propagation; *Caralluma edulis*; *ex vitro* rooting; germplasm conservation
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OP45: ASSESSMENT OF ECOLOGICAL CONDITION OF *Galanthus woronowii* LOSIN. AND *Senecio platyphyllus* M. B. IN WESTERN GEORGIA

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Georgia is rich with unique representatives of flora. Medicinal herbs are to be especially mentioned; snowdrop *Galanthus woronowii* Losin. (*Amaryllidaceae*) and flat-leaved ragwort (groundsel) *Senecio platyphylloides* Somm. et L. (*Asteraceae*) belong to their numerous list. The both species are under excessive man impact that makes their areas narrower and degrades populations. *G. woronowii* is distinguished by high decorative value that increases harvesting of their bulbs and creates more dangers to this species in nature. Within our research we have studied and more accurately defined the areas of *G. woronowii* and *S. platyphyllus*, and charted maps; information on modern state of their populations and habitats has been updated; a database has been created; laboratory studies have been carried out in order to compare the populations of *G. woronowii* in Adjara and Guria; technologies for their farming have been developed. The species is introduced in the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). We have popularized the norms of CITES together with international expert among the local population. On the preliminarily chosen land plot we have propagated *G. woronowii* by means of seed. The methods of sustained harvesting in nature of medicinal and decorative plants *G. woronowii* and *S. platyphyllus* with rare and unique properties have been worked out.

Keywords: Medicinal plants, *Galanthus woronowii*, *Senecio platyphylloides*, GIS

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OP46: FOREST GENOMICS FOR FOREST TREE BREEDING AND GENE CONSERVATION

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In advance of forest tree breeding has been a slow and difficult process because of the large size and long generation times of trees. Forest genomics has now provided new tools to study adaptation in trees. Using modern genotyping technologies which are extremely useful tools for analyzing the impacts of intensive silvicultural regimes, for identifying genes controlling interesting phenotypes, determine allelic diversity for these candidate genes in forest tree populations and directly measure adaptive allelic diversity for thousands of genes simultaneously. Genomics attempts to identify all the genes in the genome. In forestry, the definition of biotechnology covers all aspects of tree breeding and gene conservation, plant cloning, DNA genotyping and gene manipulation and gene transfer. Use of gene technology in forestry has been referred to solve major environmental problems, to generate cost-efficient renewable energy and to identify genes responsible for forest tree adaptation. Exclusively, genes which include growth (resistance against diseases, herbicide and environmental stresses) and wood properties (reducing lignin content and increasing the amount of cellulose) of forest trees draw attention more interest. In this review, we will highlight recent progress of genetic-based technologies, genomics, molecular breeding, marker mapping, genome sequences and gene transfer for sustainable forest management.

Keywords: Forest genomics, tree breeding, gene technology, gene conservations, genome sequences

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OP47: A VERY THREATENED ENDEMIC TAXON IN DJURDJURA BIOSPHERE RESERVE (ALGERIA): THE BLACK PINE OF THE MAGHREB (*Pinus nigra* Arn. subsp. *mauretana* (Maire & Peyereimhoff) Heywood).

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The aim of this work is to bring a sum useful information on the black pine of the Maghreb (*Pinus nigra* subsp. *mauretana*), which is an extremely rare species, of very high biogenetic and patrimonial value. In spite of legal protection and a privileged localization within a biosphere reserve, it is unfortunately seriously threatened (especially by fires). Its situation in the Maghreb, and more particularly in Algeria, is very worrisome, as gives evidence of catastrophic fire of august 2000, which destroyed a big part of Tikjda forest at southern Djurdjura, where the black pine is present in only one locality with approximately one hectare. An integral reserve was settled on the area where the most number of trees (470) remain, but, the results of in situ protection have been limited. This "state of the knowledge" identifies many gaps in our knowledge of biology and demographic structure of this pine and the factors which govern its evolutionary dynamics and block its development. So, the objective of this work is to provide certain data on habitat and auto-ecology of the black pine, its exact distribution in the Djurdjura mountain and its syntaxonomical value, which will allow to compensate partially these gaps. To improve conservation measures of this world biogenetic heritage, it is necessary to direct the researches in the global frame of biological conservation (case of narrow population and consanguinity problem). We know that the scarcity of populations and the narrowness of their distribution areas make them particularly exposed to genetic accidents, environmental or demographic risk, which at any time can eliminate them. But, we can expect considering the "umbrella species" concept, the still viable population of black pine on the northwest edge of Tigounatine, could benefit from the coverage of its sympatric congener, the Atlas cedar, as long as possible.

Keywords: Black pine, Djurdjura, residual species, protected area, phytosociology, fires

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OP48: DISTRIBUTION OF *Pyrus* SPECIES ACROSS THE HINDU KUSH-HIMALAYAN REGION OF NORTHERN PAKISTAN

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Hindu Kush Himalayas form the northern temperate mountainous terrain of Pakistan. The area has witnessed variety of civilization entering and disappearing here, wherein their remains are not only available as archeological records but has also left behind diverse biological resources including food crops among which the temperate fruits like pears are most important. Extensive collection of specimen pear trees available in nature or traditional farms in Northern Pakistan and Azad Kashmir were made during 2008-2011. The collected specimens were processed and deposited in Herbarium Hazara University, Mansehra. Valid names and synonyms of all the recognized taxa were typified. Key to the species along with detailed morphological description were developed. Sum 14 species viz., *P. Pashia*, *Pyrus calleryana*, *Pyrus bretschneideri*, *Pyrus pyrifolia*, *Pyrus pseudopashia*, *Pyrus communis*, *Pyrus sinkiangensis*, *Pyrus hopeienses*, *Pyrus serrulata*, *Pyrus ovoidea*, *P. turcomanica*, *Pyrus ussuriensis*, *Pyrus xerophila* and *Pyrus armenicefolia*. Among these, only two species i.e. *P. pashia* and *P. communis* were previously reported from here.

Keywords: Hindu Kush, Himalaya, Pakistan, pear, *Pyrus*.

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OP49: LINKAGES BETWEEN FOREST CONSERVATION AND MEDICINAL PLANTS OF AYUBIA NATIONAL PARK: PROSPECTIVE AND CONSTRAINTS

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Pakistan is a country of diverse climate and has several ecological regions and a variety of natural habitats. The flora is also varied and diverse, and highly fascinating. Of the nearly six thousand species of flowering plants reported to be occurring in Pakistan and Kashmir, a very large population is found in the Northern and the Northwestern parts of Pakistan. Within this zone lies the Ayubia National Park, which is representing the moist temperate eco-region, and within which are found more than hundred medicinal plants species in 33km² areas. Locals rely on medicinal plants for curing different ailments since time immemorial. However, recent and ever increasing dependency of locals on allopathic drugs along with industrialization, urbanization and globalization trends slowly but surely are modifying indigenous values and culture. The existing ethnobotanical knowledge of the area will not remain intact for long. In order to identify plants of high medicinal value, ethnopharmacological study was conducted. 94 plant species of 87 genera belonging to 51 families have been identified including 337 indigenous recipes. Biotic pressure on Ayubia National Park for fuelwood, timber and to some extent fodder collection has threatened few species of the area to critically endangered (5), Endangered (10) and vulnerable (35) status.

Keywords: Ayubia National Park, Medicinal plants, Deforestation and Forests conservation

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POSTER PRESENTATIONS
(Alphabetically Listed Based on the Presenter's Last Name)

PP1: CONSERVATION ISSUES OF NON WOODEN PLANT RESOURCES IN MIANDAM VALLEY SWAT

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Non wooden plant resources are the emerging tools for providing better livelihood opportunities to communities and reducing pressure on forest for timber extraction. Miandam valley is the rich biodiversity center, providing habitat to these resources. This study was focused mainly to sort out potential in the forest resources of the valley to subsidize and provide alternate income sources to community. Field survey and estimation shows that the non wooden plant resources of the valley, gives subsidy of about 19.5 million rupees, to the local people. Among fruits, share of *Juglans regia* and *Diospyrus kaki* are 13.5 million rupees and are the main forest produce, which are extracted from the valley. People of the area have traditional knowledge regarding the use of medicinal and aromatic plants. They use these plants for satisfying basic requirements of health care. Beside this medicinal plants of the valley play important role and also provide alternate earning source to community of the area. Among medicinal plants, majority of collectors generally practice collection of *Viola canescens*, *Aconitum violaceum* var. *violaceum*, *Bistorta amplexicaule*, *Podophyllum hexandrum* and *Paeonia emodi* for sale in the market. The locals are earning about 3.5 million rupees annually through trade of these medicinal plants. The unsustainable collection practices are resulting in reduction of quantity and quality of these NWPRs. The potential of these NWPRs can further be increased by providing basic skills regarding sustainable pre and post harvest methods of these plant resources. This will directly reduce poverty of the locals. Other important non wooden plant resources from the valley are vegetables, honey, gums and fodder providing good return to people of the area.

Keywords: Non Wooded Plant Resources, medicinal plants, Miandam valley, Swat, Pakistan

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PP2: CHEMICAL COMPOSITION OF THE ESSENTIAL OILS OF *Scaligeria napiformis* (Willd.) GRANDE (Apiaceae) AERIAL PARTS

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The essential oil composition of *Scaligeria napiformis* (Willd.) Grande was determined as the first time. It is named as “Turp anasonu” in Turkish. The essential oil of wild-growing *Scaligeria napiformis* (Apiaceae) from Turkey was obtained by hydrodistillation and analyzed chemically by GC and GC-MS. Altogether, thirty-eight constituents, representing 89.3% of the total oil composition were identified. The essential oil was dominated by beta-elemene (14.9%), caryophyllene oxide (9.9%), alpha-cadinol (8.7%), 4-bromo-1-naphthalenamine (7.4%) and 1-methyl-2-pyrrolidinone (6.0%).

Keywords: *Scaligeria napiformis*, Apiaceae, essential oil, GC-MS, □ □ elemene

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**PP3: ESSENTIAL OIL COMPOSITION OF *Papaver rhoeas* L. (corn poppy)
(papaveraceae) FROM TURKEY**

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The genus *papaver* is represented with the 50 taxa Turkey flora, and it is the important genus in means of medicinal and aromatic plants. It has different type alkaloids. In the mediterranean, corn poppy greens are eaten as a vegetable. In this study, *Papaver rhoeas* was collected from the Elazıđ region and analysed chemically to determine the essential oil composition. The essential oil of the aerial parts of essential oil obtained by hydrodistillation from *Papaver rhoeas* was investigated by GC and GC-MS. The essential oil yield is 0.2 (v/w). Twenty one constituents were comprised the 98.6% of the total essential oil extracted from the plant. The predominant compounds of *Papaver rhoeas* were determined as phytol (52.8%), tricosane (7.8%), 2-pentadecanone (6%), heneicosane (5.3%). Consequently, sesquiterpene hydrocarbons were shown to be the main group of essential oil of the species. The results were discussed with the genus patterns and renewable resources.

Keywords: *Papaver rhoeas*, GC-MS, essential oil, phytol.

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**PP4: ESSENTIAL OIL COMPOSITION OF ENDEMIC *Sideritis dichotoma* HUTER
(Lamiaceae) FROM TURKEY**

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The genus *Sideritis* is represented with the 45 species and some subspecies in Turkey flora. The genus patterns are used as medicinal and herbal plants all over the world and Turkey. The plant is showed a strong antioxidant activities and it has diuretic effect. In this study, the chemical composition of essential oil obtained by hydrodistillation of *Sideritis dichotoma* Huter was investigated by GC and GC-MS. The essential oils yield is 0.3 (v/w). Fourty constituents were comprised the 96.7 % of the total essential oil extracted from the *Sideritis dichotoma*. The predominant compounds of plant were determined as beta-pinene (28.5%), alpha-pinene (22.5%), limonene (4.6%), alpha-terpinene (4.5%). The results were discussed with the genus patterns in means of chemotaxonomy and natural products.

Keywords: *Sideritis dichotoma*, GC-MS, eEssential oil, beta-Pinene, alpha-Pinene.

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**PP5: COMPOSITION OF THE ESSENTIAL OILS OF TWO *Scutellaria* HERBS
(*Scutellaria orientalis* L., and *Scutellaria bicolor* hochst.) GROWING WILD IN TURKEY**

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In this study, the essential oil composition of *Scutellaria orientalis* L. and *S. bicolor* Hochst. from Turkey were determined. The qualitative and quantitative essential oil contents of both species was determined and compared with each other. The chemical composition of essential oils obtained from the aerial parts by hydrodistillation of *Scutellaria orientalis* and *S. bicolor* were investigated by GC and GC-MS. The essential oil yields was 0.2 and 0.3 (v/w) in *S. orientalis* and *S. bicolor* respectively. Twenty one constituents were comprised the 97.9 % of the total essential oil extracted from the *S. orientalis* and twenty four constituents were comprised the 98.3% total oil in *S. bicolor* essential oil. The predominant compounds of *S. orientalis* were determined as germacrene D (63.2%), bicyclogermacrene (14.1%), spathulenol (4.7%), alpha-cadinol (3.3%) and also Germacrene D (40.3%), beta-caryophyllene (25.2%), bicyclogermacrene (13.2%), alpha-humulene were the main compounds in the essential oil of *S. bicolor*.

Keywords: Essential oil, *Scutellaria orientalis*, *Scutellaria bicolor*, Germacrene D.

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**PP6: ESSENTIAL OIL COMPOSITION OF ENDEMIC *Scutellaria sintenisii* Hausskn.
ex Bornm (Lamiaceae) FROM TURKEY**

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Scutellaria sintenisii is used in traditional folk medicine and it has some pharmacological effects. It is an endemic species to Turkey. In this study, hydro-distilled essential oil derived from the aerial parts of *Scutellaria sintenisii* (Lamiaceae) grown in Turkey were analysed by GC and GC-MS system. The essential oil yield was 0.1 (v/w). Twenty four components were identified representing 97.7% of the oils. The predominant compounds of *Scutellaria sintenisii* were determined as carvacrol (73.8%), alpha-cadinene (5.3%), p-cymene (3.4%), thymol (3.4%) and linalool-L (2.4%). Essential oil analysis of the plant has shown that it has carvacrol chemotype. The results were discussed with the genus patterns in view of chemotaxonomy and natural products.

Keywords: Essential oil, *Scutellaria sintenisii*, carvacrol, chemotype

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PP7: PHENOLOGICAL FOLLOWED UP OF THE OLIVE TREE FERKENI VARIETY (*Olea europaea* Var ferkeni) ENDEMIC TO THE REGION OF TEBESSA (Extreme Eastern Algeria)

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The olive tree (*Olea europaea* L.) is one of the first species of trees domesticated and cultivated in the Mediterranean region for more than 4000 years. Its historic, economic and social importance is established. In Algeria, *Olea europaea* ssp sativa include a variety named ferkeni which is endemic to Tébéssa area. This area is located in the extreme eastern of Algeria in the pre-Saharan steppe zone and characterized by a semi-arid climate. The present study focuses on phenological follow up (since vegetative rest stage to fruits maturation), of 10 samples of this variety grown in the Ferkene commune (latitude 34 ° 29 '13.32 "North, longitude 7 ° 28' 6.91 "East) during the years 2011 and 2012. The length and the diameters of branches and the number of knots were also measured on four branches located in the four cardinal directions (north, south, east and west) of each sampled tree. The results show that the ferkeni variety of olive tree has precocious phenological stages compared to other varieties, probably favored by the high temperature in this region. The descriptive analysis revealed that the length of branches, their diameter, the number of knots per branch increase over the years with an advantage for branches exposed towards the East. Known to have good productivity, *Olea europaea* var ferkeni should be valued and its culture should be extended to other similar pre-Saharan areas of Algeria.

Keywords: *Olea europaea* var *L ferkeni*, endemic variety, phenological followed up, tebessa, extreme eastern algeria

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**PP8: POLLEN AND SEED MORPHOLOGY OF THE SECTION
MACROPHYLLIUM BOISS. OF THE GENUS *Astragalus* L. (Leguminosae) IN
TURKEY**

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Section Macrophyllium is represented by 8 taxa, and six of these are endemic to Turkey. The species of section possess the largest leaves and inflorescences within the tragacanthic *Astragalus* species. Turkey, with 6 species, is the main diversification centre of the section. Morphological features of pollen and seeds were examined using light (LM) and scanning electron microscopy (SEM). The pollen grains are radially symmetric and isopolar. Pollen shape is spheroidal, prolate-spheroidal or prolate with the polar axes 25,4-41,4 µm and the equatorial axes 24,05-31,14 µm. The pollen grains are trizonocolporate and exist a granulate operculum. Ornamentation observed as perforate (*A. isauricus*, *A. longifolius*, *A. cephalotes* and *A. yukselii*), microreticulate-perforate (*A. oleifolius*) or perforate at polar area and microreticulate at equatorial area (*A. dipodurus*). The colpi are long and narrow (Clg: 19-32,6 µm, Clt: 2,95-6,3 µm), porus observed as suboblate, oblate-spheroidal, spheroidal or prolate. The seeds sizes are between 3,07-3,85 x 2,07-2,85 mm. Their shape is ellipsoidal and reniforme. The seeds weight measured between 0,0053-0,016 gr. The colour shows slight brown (*A. oleifolius*, *A. isauricus*), light yellow (*A. longifolius*, *A. cephalotes*) light brown or light brown with faint black spotted (*A. yukselii*, *A. dipodurus*). Seeds ornamentation were observed psilate in the LM micrograph and rugulate, reticulate, psilate-rugulate, in the SEM micrograph.

Keywords: Leguminosae, astragalus, section macrophyllium, pollen morphology, seed morphology, Turkey

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PP9: MORPHOLOGICAL, ECOLOGICAL, PALYNOLOGICAL AND SEED SURFACE PROPERTIES OF *Reseda aucheri* BOISS. SUBSP. *rotundifolia* (Kotschy ex Müll.-arg.) RECH.F.

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Resedaceae is represented by *Reseda* genus in Turkey. The genus has 6 endemic species (% 27.3) and 9 endemic taxa (% 40.9) and 22 indigenous taxa in Turkey. *Reseda*, containing approximately 65 species worldwide, are widely distributed in the Mediterranean basin. The species of *Reseda* genus are annual or perennial herbs and occur in limestone soils and arid environments. Species diversity, endemism number and phylogenetic relationships in *Resedaceae* suggest two major centers of differentiation, one in the western Mediterranean and the other in the eastern Mediterranean and southwest Asia. In this study, morphological, ecological, palynological properties and seed morphology of *Reseda aucheri* Boiss. subsp. *rotundifolia* (Kotschy ex Müll.-Arg.) Rech.f. are presented.

Keywords: *Reseda aucheri*, morphology, ecology, palynology, seed surface, Turkey

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**PP10: ESSENTIAL OIL COMPOSITION OF *Pinus nigra* subsp. *pallasiana* (Pinaceae)
FROM TURKEY, A CHEMOTAXONOMIC APPROACH**

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The chemical composition of the essential oils of *Pinus nigra* Arn. subsp. *pallasiana* (Lamb.) Holmboe (Black pine) twigs naturally grown in Turkey were analyzed by GC and GC-MS system. *Pinus nigra* subsp. *pallasiana* samples were collected from different localities (Adana, Adıyaman, Antalya and Elazıđ) in Turkey and the twigs were hydrodistilled by Clevenger apparatus. The qualitative and quantitative essential oil variation has determined among the black pine populations. Forty three (Adana), forty (Adıyaman), twenty nine (Antalya) and forty three (Elazıđ) components were identified representing 90.7%, 97.8%, 98.4% and 86.5% of the oils, respectively. The main compounds of Black pine studied were found as germacrene D, alpha-pinene, delta-3-carene, beta-pinene, dl-limonene and beta-caryophyllene in the majority of populations. Chemical differences were discussed infrapopulational and infraspecific means.

Keywords: *Pinus*, black pine, essential oil, chemotaxonomy, GC-MS, alpha-pinene, beta-pinene, germacrene D.

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PP11: ANTIOXIDANT ACTIVITY OF SOME ORGANIC EXTRACTS FROM THE ENDEMIC MEDICINAL PLANT *Anabasis aretioides* COSS. & MOQ.

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The last decades are marked by the special interest in the development of medicinal plants at interest as a source of bioactive natural. As a result, many studies focus, increasingly, on the therapeutic effects of natural antioxidants. *Anabasis aretioides* Coss. & Moq. is one of the endemic medicinal plants from Algerian Sahara. It's used for many traditional therapies of various diseases. In this study, we investigate the content of different organic solvents on phenolics and flavonoids, and also their antioxidant activities using two conventional methods: the DPPH and hydrogen peroxide scavenging activities. From the obtained results, we found that the ethanolic extract presented the high level of phenolic and flavonoid contents (231.85 ± 20.59 mg GAE/g and 132.8 ± 24.58 mg CEQ/g). The EC₅₀ of different extracts were arranged between 47.71 to 86.73 µg/mL. A highest hydrogen peroxide activity was observed in ethyl acetate extract compared to used references (BHA and α-tocopherol).

Keywords: *Anabasis aretioides*, endemic plant, phenolic compounds, flavonoids, antioxidant activity, DPPH, hydrogen peroxide

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**PP12: ASSESSMENT OF SOME BIOLOGICAL ACTIVITIES OF METHANOLIC
CRUDE EXTRACT FROM *Polygonum maritimum* L.**

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Much attention has been paid to the antioxidants, which are expected to prevent food and living systems from peroxidative damage. Incorporation of synthetic antioxidants in food products is under strict regulation due to the potential health hazards caused by such compounds. The use of plants as traditional health remedies is very popular and important for 80% of the world's population in African, Asian, Latin America and Middle Eastern Countries. Their use is reported to have minimal side effects. In recent years, pharmaceutical companies have spent considerable time and money in developing therapeutics based upon natural products extracted from plants. In other part, due to the continuous emergence of antibiotic-resistant strains there is continual demand for new antibiotics. Chemical compounds from medicinal plant especially are targeted by many researches. In this light, genus *Polygonum* (*Polygonaceae*), comprising about 45 genera (300 species), is distributed worldwide, mostly in north temperate regions. They have been reported to have uses in traditional medicine, such as anti-inflammation, promoting blood circulation, dysentery, diuretic, haemorrhage and many other uses. In our study, *Polygonum maritimum* (from Algerian coast) was extracted with 80% methanol to obtain a crude extract. *P. maritimum* extract (PME) had a very high content of total phenol, which was 352.49 ± 18.03 mg/g dry weight, expressed as gallic acid equivalent. PME exhibited excellent antioxidant activity, as measured using DPPH and H₂O₂ scavenging assays. It also showed a high antibacterial activity against gram positive bacterial strains: *Bacillus cereus*, *Bacillus subtilis* and *Staphylococcus aureus* with an MIC 0,12 mg/mL.

Keywords: *Polygonum maritimum*, crude extract, antioxidant activity, antibacterial activity.

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PP13: THE COMPOSITION OF THE ESSENTIAL OIL OF THREE *Helichrysum plicatum* DC. SUBSPECIES (Subsp. *plicatum*, Subsp. *polyphyllum* AND Subsp. *pseudoplicatum*) (Asteraceae) FROM TURKEY, A CHEMOTAXONOMIC APPROACH

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In this study, the chemical composition of the essential oils obtained from the aerial parts of three *Helichrysum* subspecies (*Subsp. plicatum*, *subsp. polyphyllum* and *Subsp. pseudoplicatum*) naturally grown in Turkey were analysed by GC and GC-MS and chemical differences were discussed in means of chemotaxonomy. The aerial parts of the plant samples were hydro-distilled to produce oils in the yields of 0.3, 0.5 and 0.3% respectively. Sixty, seventy and fifty nine components were identified representing 89.3, 88.0 and 95.2 % of the oils, respectively. The main compounds in the essential oil of *Helichrysum plicatum* subsp. *plicatum* were; trans-Caryophyllene (30.83%), alpha-Humulene (17.08%), Caryophyllene oxide (10.00%), Humulene epoxide II (5.64%), 10,10-Dimethyl-2,6-dimethylenebicycl(7,2,0) undecan-5 beta-ol (3.38%), in the *Subsp. polyphyllum* essential oil were; Zonarene (5.79%), Spathulenol (5.50%), Caryophyllene oxide (5.10%), Myrtenal (4.64 %), 4,4-Dimethyl-3-3(3-methylbut-3-enylidene) (4.11%); and in the *Subsp. pseudoplicatum* essential oil were; 1,8-Cineole (9.22%), Caryophyllene (5.88%), alpha-Humulene (5.47%), Germacrene-D (5.36%), alpha-pinene (4.57%). The results were discussed with the genus patterns in means of chemotaxonomy and usability the essential oils and compounds in medicinal and pharmaceutical purposes.

Keywords: *Helichrysum plicatum*, Asteraceae, GC-MS, essential oil, chemotaxonomy

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**PP14: THE MORPHOLOGY, ANATOMY AND PALYNOLOGY OF ENDEMICS
Helichrysum noeanum BOISS. AND *H. arenarium* Subsp. *aucheri* (Asteraceae)**

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The morphological, anatomical, palynological features of the *Helichrysum noeanum* Boiss. and *H. arenarium* subsp. *aucheri*, an endemic taxon to Turkey, were studied in order to understand the usefulness of these features for systematic purposes. The specimens belonging to both species were collected from different locations from Turkey and investigated to observe similarities and differences between two taxa. At first, the morphological and morphometrical features of both *Helichrysum* taxa were observed and stem and root properties were investigated by cross section with light microscope. Pollen features of both taxa were observed with the Light and Scanning Electron Microscopy (SEM). Both species were found different by each other morphologically with some characters, particularly, basal leaves, stem, cauline leaves, flowers, phyllaries, tubular flowers features. Anatomical features supported by illustration and these characters were observed to have been similar to usual features of *Helichrysum* anatomy. The pollen type of both taxa were determined as tricolporate, pollen shape was oblate-spheroidal and reticular pollen ornamentation was observed. Consequently, there are some morphological, morphometrical differences in both species, but no significant differences were determined in view of pollen characters and anatomical features. The results were discussed in view of infrageneric means.

Keywords: *Helichrysum*, *Asteraceae*, morphology, anatomy, pollen, SEM

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PP15: THE POLLEN MORPHOLOGY OF ENDEMIC *Cirsium miller taxa* GROWN IN NE ANATOLIA (TURKEY)

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In this study, the detailed morphological structure of the pollen of the three endemic *taxa*, which are *C. trachylepis* Boiss., *C. sommierii* Petrak and *C. pseudopersonata* Boiss. & Bal ssp. *pseudopersonata*, were observed by light microscope for the first time. *Taxa* were collected from different localities of NE Anatolia in 2007 and 2013. Pollen grains were prepared for light microscopy using the Wodehouse method. At least 30 pollen grains were evaluated per populations. The polar axis (P), equatorial axis (E, polar and equatorial view), colpus length (clg) and width (clt), porus length (plg) and width (plt), length of one side of triangular polar area, length and width of spine, exine thickness were measured on the pollen grains. Pollen shape and exine ornemantation was determined.

Keywords: *Cirsium*, Pollen morphology, Endemic plant, Light microscope, Turkey

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PP16: CONTRIBUTIONS TO THE GASTEROID MYCOTA OF PAKISTAN

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Gasteromycetes are a morphological category of Homobasidiomycetes taxonomically placed in Basidiomycota, traditionally including puff-balls, earth stars, bird's nest fungi and stink horns. Gasteromycetes are mainly terrestrial and epigeous or hypogeous, partly saprobes and partly ectomycorrhizal in nature. They are cosmopolitan in occurrence and generally found in dry and hot regions. During the exploration of basidiomycetes of Pakistan, twenty gasteroid fungi were collected and identified from district Mansehra, Pakistan. These taxa were placed in nine genera viz. *Astraeus*, *Bovista*, *Calvatia*, *Crucibulum*, *Cyathus*, *Geastrum*, *Lycoperdon*, *Phallus* and *Pisolithus*. Out of these described taxa one taxon i.e. *Lycoperdon alpinum* nom. prov. is new to science while two taxa viz. *Crucibulum parvulum* and *Calvatia lilacina* are new records for Pakistan. These gasteroid taxa have been described, identified and discussed.

Keywords: Pakistan, Basidiomycetes, Diversity, Gasteromycetes, Taxonomy

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**PP17: CHROMOSOME NUMBER AND KARYOTYPE OF ENDEMIC SPECIES OF
TURKEY *Ankyropetalum reuteri* BOISS. & HAUSSKN (Caryophyllaceae)**

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Chromosome number and karyotype analysis of Turkish endemic *Ankyropetalum reuteri* Boiss. & Hausskn. at (VU) status were investigated in the present work first he first time. The chromosome number is $2n = 26$ with haploid karyotype formula $7m + 6sm$. Metaphase chromosome length ranging from 1.53 to 2.51 μm and the total haploid chromosome length was 26.95 μm .New lokalities of *A. reuteri* were given.

Keywords: *Ankyropetalum reuteri*, chromosome number, karyotype, Caryophyllaceae

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PP18: OUR ENDANGERED SPECIES *Lilium martagon* L. AND ADVICES FOR PROTECT TO IT

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Lilium martagon that belongs to Liliaceae family is a perennial and geophyte species. As in many European countries including Turkey, *Lilium martagon* takes part in the list of endangered rare plants and its population has status of “VU” may be damaged in the red book of plants of Turkey. *Lilium martagon* L. is called as “Turks Cap” out of Turkey and attracts attention with showy flowers status and predisposition to production of cutting flower. Removing from the nature of this sort of species for export is threatened its presence in the nature environment. According to list of export of natural bulb in 2014, export of *L. martagon* has been indicated as being subject to quotas. In Northwestern of Turkey, *L. martagon* spreads shady coastal and in deciduous forests as natural. Known as “Turks Cap” *L. martagon* is potentially at risk because of ongoing and planned irrigation ponds, dam’s basin, hydroelectric and thermal power plants, mines and construction sites in quarries where *L. martagon* has living space. The other element of risk threatening the presence of genus of species is forestry practices that cause the degeneration of the habitat in which *Lilium martagon* spreads as natural. In order to protect for continued presence of species` population, both in-situ and ex-situ environmental conservation measures are needed.

Keywords: *Lilium martagon*, endangered, red list, conservation, Turkey
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PP19: REVIEW OF THE CAUCASIAN SPECIES OF GENUS *Symphytum* L.

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Caucasian species of genus *Symphytum* L., 10 in all, are represented in the Caucasus by three sections: Coerulea Buckn. (*S. asperum* Lepech., *S. peregrinum* Lebed., *S. hajastanum* Gviniashvili, *S. caucasicum* Bieb.), Lingulata Pawl. (*S. ibericum* Stev., *S. abchasicum* Trautv., *S. ciscaucasicum* Gviniashvili, *S. grandiflorum* DC., *S. tauricum* Willd.) and *Symphytum* (*S. officinale* L.). *Symphytum* is related to typical elements of Eastern-Mediterranean flora. In section Coerulea, which we relate to sub-endemic Caucasian-Asian-minor section, together with *S. asperum*, three closely related species – *S. peregrinum*, *S. hajastanum* and *S. caucasicum* should be mentioned. *S. peregrinum* is a hircanic species, whose geographic distribution may be extended to northern part on Iran. *S. caucasicum*, a somewhat isolated, endemic Caucasian species. Taxa remarcat morphologically, geographically and coenotically are also characterized by different chromosome numbers – *S. asperum* $2n=32$, *S. peregrinum* $2n=40$, *S. caucasicum* $2n=24$. *S. ibericum* and *S. grandiflorum* are vicarious species. *S. ibericum* is distributed in western part of the Caucasus and north-easter Anatolia; *S. grandiflorum* occupies a small area in eastern Transcaucasus. The local endemic species of Abchasia – *S. abchasicum* is characteristic for mized oak woods and endemic species of north-western part of the Caucasus – *S. ciscaucasicum* lives in beech woods. Along with coenotic similarity, these species are characterized by geographical isolation and caryological differentiation: *S. ibericum* $2n=24$; *S. grandiflorum* $2n=60$, *S. ciscaucasicum* $2n=36$. These endemic species represent ancient, tertiary period autochtonic groups of Caucasian flora. *S. tauricum* can be found sporadically. The characteristic disjuncted area indicates that *S. tauricum* belongs to the group of relict circum-euxine species. Polymorphic species *S. officinale*, which is characteristic of deciduous shrublands, is broadly distributed in whole Europe, but it is not characteristic of Caucasian flora, and is known only from the North Caucasus. The study of Caucasian species of *Symphytum* indicate the active process of speciation within old relict groups in different populations and coenosis.

Keywords: Caucasian species, *Symphytum* L., flora.

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**PP20: ANALYSIS OF THE ESSENTIAL OIL *Pimpinella peregrina* L. (Apiaceae)
FROM TURKEY**

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The volatile oil composition of *Pimpinella peregrina* L. (Apiaceae) collected from Bitlis was determined. It is named as “El Anasonu” in Turkish. The essential oil were obtained by hydrodistillation in Clevenger-type apparatus, and chemical analyses were performed by GC and GC–MS. The essential oil yield was 0.3 (v/w), from the aerial parts of the *Pimpinella peregrina*. A total of 20 different compounds were identified representing 90.1% of the oils. The main constituents of *Pimpinella peregrina* trans-pinocarveol (35.1%), peregijerene (15.1%), alpha-cubebene (12.4%), (+) epibicyclosiquiphellandrene (7.5%), and alpha-terpineol (6.7%) were determined. The results were discussed with the genus patterns and in means of renewable resources.

Keywords: *Pimpinella peregrina*, Apiaceae, trans-Pinocarveol, essential oil

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**PP21: VOLATILE OIL COMPOSITION OF *Ferulago angulata* (schlecht) BOISS.
(Apiaceae) FROM TURKEY**

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The herbs and spices of *Ferulago angulata* are used as flavors and antioxidants in food industry for century. The essential oil composition of *Ferulago angulata* (Schlecht) Boiss. (Apiaceae) (oluklu akşır – Turkish name) aerial parts was determined. The water distilled essential oil of the plant was analysed by GC, GC-MS system. In the result of analysis, forty eight compounds were identified representing 96.5% of the oils. The main compounds of *Ferulago angulata* were alpha-pinene (24.1%), beta-pinene (22.7%), beta-phellandrene (20.5%), alpha- phellandrene (12.1%). Monoterpenes were the main class of essential oil of *Ferulago angulata* (ca. 80-85%). The results has shown that the parts of the plant and essential oil may be used as natıral product and food additive.

Keywords: *Ferulago angulata*, essential oil, alpha-Pinene, Monoterpenes, Flavor and fragrance.

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**PP22: ESSENTIAL OIL COMPOSITION OF *Anthriscus nemorosa* (bieb.) SPRENGEL
(Apiaceae) FROM TURKEY**

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The genus *Anthriscus* (*Apiaceae*) is represented with 8 species in Turkey flora. It is reported that the plant parts are used in the preparation of the “otlu peynir” famous cheese around the Van province in Eastern Anatolian region. In this study, hydro-distilled essential oils derived from the aerial parts of *Anthriscus nemorosa* (Bieb.) Sprengel. grown in Turkey naturally were analysed by GC and GC-MS. The essential oil yield was determined as 0.2 (v/w). Among eighteen compounds identified (representing 85.9% of the total oil), the main components were: beta-caryophyllene (23.6%), caryophyllene oxide (12.3%), delta-cadinene (12.1%), and trans pinocarveol (9.8%). Essential oil analysis of the *Anthriscus nemorosa* has shown that it has beta-caryophyllene chemotype from the Eastern Anatolian Region

Keywords: Essential oil, *Anthriscus nemorosa*, beta - Caryophyllene, chemotype

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**PP23: ESSENTIAL OIL COMPOSITION OIL OF *Chaerophyllum crinitum* BOISS
(Apiaceae) FROM TURKEY**

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This study, reports the essential oils composition of the aerial parts of *Chaerophyllum crinitum* Boiss. The oil has obtained by using *Clevenger apparatus* and analysed by GC and GC/MS system. The analysis has led to the identification of 64 components comprising 85.5% of the oils. The essential oil yield was determined as 0.2 (v/w) and the main constituents of the essential oil were alpha-terpinolene (20.3%), beta-cubebene (9.3%), alpha-terpineol (7.2%), limonene (5.8%), p-cymene (5.0%) and 3-cyclohexen-1-ol (4.3%). The results was evaluated in means of natural products and chemotaxonomy.

Keywords: *Chaerophyllum crinitum*, *Apiaceae*, essential oils, alpha-terpinolene, natural product.

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PP24: GENETIC DIVERSITY OF *Juniperus turbinata* SUBSP. CANARIENIS IN THE CANARY ISLANDS. IMPLICATIONS IN CONSERVATION

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Juniperus turbinata Guss. is a species from the Mediterranean and Macaronesian regions that very often is located in isolated populations that correspond to environments in which soil and climatic conditions are unfavorable, such as coastal dune formations, litorales, cold moors or windy areas. *J. turbinata* is of great interest from the point of view of conservation since this species can be found in habitats given priority in the European Directive 92/43 EEC. In this work, AFLP (Amplified Fragment Length Polymorphism) analysis was conducted on eight natural populations of *Juniperus turbinata* subsp. *canariensis*, covering quite his area of distribution, to evaluate the levels of genetic variation present within and among the populations and how they are partitioned to improve the conservation guidelines. Populations exhibit moderate levels of genetic diversity ($H_j = 0.198$ to 0.233), as well low levels of genetic differentiation ($F_{ST} = 0.064$). In spite of this low genetic differentiation, the distribution of genetic diversity seems to be partitioned in three groups: Hierro island populations, Gran Canaria populations and a third group that includes Tenerife, La Palma and La Gomera. These results can be used to propose in situ and ex-situ conservation guidelines. This work has been supported by a Ministry of Economy and Competitiveness CGL2011-30099 project grant to Pedro Sánchez Gómez.

Keywords: AFLP molecular markers, conservation genetics, *Juniperus turbinata*

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PP25: STUDY THE EFFECT OF SOIL DEPTH ON OF SEED BANK CHARACTERISTICS (CASE STUDY: SISAB REGION, NORTH KHORASAN PROVINCE, IRAN)

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Soil seed banks are a source for re-establishment of species which are lost from the above-ground vegetation. Hence, maintenance and restoration of species-rich grasslands will also depend on the soil seed bank. Basically, the composition of a seed bank depends on the contribution of present and former above-ground plant communities. So current study has carried out in semi-arid rangelands. Four 100 m transects were established perpendicular to the four sides of study area. Ten systematically selected plots (2*2 m) were established along each transect. With an auger with a diameter of 5 cm, 10 soil cores were collected randomly; These samples were divided in two sub-samples (0-5 and 5-10 cm) and the sub-samples were then pooled per soil layer for each plot. Density, diversity and species richness were measured for soil seed bank in each depth. We compared the values of the alpha diversity and seed density using the paired sample T-test. Results of greenhouse experiments during 6 months showed that there are 48 Species in study area, which 31 species exist in 0-5 cm depth and 24 species in 5-10 cm depth, there also were 15 species common in both depths. Paired sample T-test showed that density, richness and diversity decreased by increasing depth.

Keywords: Density, diversity, richness, rangeland

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PP26: CURRENT STATUS OF THREE RARE ENDEMIC PLANT SPECIES FROM ERZINCAN-KEMALIYE REGION

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Onosma discedens Hauskkn. & Bornm. (Boraginaceae) , *Teucrium leucophyllum* Montbret & Aucher ex Bentham (*Lamiaceae*) and *Verbascum calycosum* Hauskkn. ex Murb. (*Scrophulariaceae*) are rare endemic plant species having considerably narrow distribution in Erzincan region. These three species were recorded as extinct (EX) in Turkish Plants Red Data Book, however, they have been collected from their original localities during the field works between 2003-2005. To date, no studies intended for conservation of these species available. In this study, with extensive field work in Kemaliye region, possible new localities for these species were searched, population sizes, reproduction types, some reproductive characteristics and threat factors of these species were determined. Germination success of their seeds under laboratory conditions were also investigated. Besides, soil characteristics of the species localities were determined. This study will contribute important data to clarify genetic and ecological factors that may have posed extinction risks for *Onosma discedens*, *Teucrium leucophyllum* and *Verbascum calycosum*, and also to make suggestions for the conservation of these species.

Keywords: *Onosma discedens*, *Teucrium leucophyllum*, *Verbascum calycosum*, rare endemic plants, conservation

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PP27: NOTES ON THE DISTRIBUTIONS, ECOLOGY, POLLEN AND SEED MORPHOLOGY OF ENDEMIC *A. vaginans* DC. (Leguminosae) IN TURKEY

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Astragalus vaginans DC. is a monotypic taxa which belongs to sect. Hymenostegis subsect. Hymenocoleus (Bunge) Podlech & Zarre. Morphological features of pollen and seeds were examined using light and scanning electron microscopy. The pollen grains are isopolar. The shape is prolate-spheroidal, with the polar axes 28-32 µm and the equatorial axes 24-28 µm. The pollen grains are trizonocolporate, exist granulate operculum. The sculpturing show psilate-perforate at polar area and perforate ornamentation at equatorial area. The colpus are long and narrow with acute end (Clg: 24-27 µm, Clt: 1,8-4,5 µm), porus is oblate-spheroidal (Plg: 6,8-9, Plt: 8-10,5). Aperture margin shows psilate sculpturing. The seeds 2,32 x 4,41 mm, ellipsoid and reniforme. The weight of the seeds were 0,01270 gr. The colour was light brown. Seed ornamentation psilate at the light microscopy and reticulate-papillate at the scanning electron microscopy. *A. vaginans* spreads in Konya, Adana, Mersin, Amasya, Içel, Elazığ and Niğde. The flowering time is July. Its habitat is clearings in Pinus forest and roadsides, 400-1350 m. The Red List category is LC.

Keywords: Leguminosae, *Astragalus*, pollen morphology, seed morphology, endemic, Turkey
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**PP28: THE ENDEMIC AND RARE PLANT TAXA OF PSEUDOMACCHIE
VEGETATION IN DEĞİRMENDERE WATERSHED (Trabzon-Turkey)**

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Flora of the pseudomacchie vegetation in Değirmendere Watershed was studied between 2011-2013 and totally 370 vascular plant taxa were identified. As a result of the study, endemic *Sempervivum minus*, *Astragalus viridissimus*, *Geranium sintenisii*, *Dianthus carmelitarum*, *Onosma isaurica*, *Linaria corifolia*, *Lamium galactophyllum*, *Cirsium trachylepis* and *Astragalus ovatus* together with rare *Myosotis lazica*, *Myosotis sparsiflora* and *Galanthus rizehensis* were identified and classified according to IUCN threat categories. As well, the photos of these 9 endemic and 3 rare taxa were presented here. In this poster, 12 endemic and rare plants will be represented with IUCN threat categories, threat factors, plants distribution areas and photos.

Keywords:Endemic, rare, IUCN threat categories, Pseudomacchie vegetation, Trabzon

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**PP29: PHYTOCHEMISTRY OF THE LEAVES OF *Ricinus communis* L.:
CYTOTOXICITY AND ANTIMICROBIAL PROPERTIES**

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The aim of the present study was to appraise the antimicrobial activity of *Ricinus communis* L. essential oil against different pathogenic microorganisms and the cytotoxic activity against HeLa cell lines. The essential oil from the leaves of *Ricinus communis* L. was analyzed by GC-MS and bioassays were carried out. Five constituents of the oil were identified by GC-MS. The antimicrobial activity of the oil was investigated in order to evaluate its efficacy against twelve bacteria and four fungi species, using disc diffusion and minimum inhibitory concentration methods. The essential oil showed strong antimicrobial activity against all microorganisms tested with higher sensitivity for *Bacillus subtilis*, *Staphylococcus aureus* and *Enterobacter cloacae*. The cytotoxic and apoptotic effects of the essential oil on HeLa cell lines were examined by MTT assay. The cytotoxicity of the oil was quite strong with IC₅₀ values less than 2.63 mg/ml for both cell lines. In conclusion, the present study showed the potential antimicrobial and anticarcinogenic properties of the essential oil of *Ricinus communis* L., indicating the possibilities of its potential use in the formula of natural remedies for the topical treatment of infection.

Keywords: *R. communis*, essential oil, antimicrobial activity, cytotoxicity

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**PP30: STUDY OF SELF-REPRODUCTION CAPACITY AND EX-SITU
CONSERVATION OF ENDEMIC SPECIES *Campanula kachetica* KANTSCH.
INCLUDED IN THE RED LIST OF ENDEMIC PLANTS OF THE CAUCASUS
REGION**

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Campanula kachetica or Kakhnetian bellflower occurs in environs of Dedoplistskaro Municipality (East Georgia) on limestone massifs of Jurassic period. It is local endemic of Kiziki historical province. Distribution range of target species is very limited and its population has declined in recent years due to habitat destruction and other anthropogenic factors. Our research was aimed at studying the capacity for self-reproduction of the species. With this aim reproduction processes taking place until the embryo formation, from the stage of bud until the stage of mature seed have been investigated. Cytoembryological studies have revealed almost 100% fertility of pollen and rapid rate of the pollen tube growth in 12% saccharose solution. Actual seed-forming capacity was established in both - freely flowering (non-isolated) individuals and isolated ones. High germination percent under laboratory conditions and high growth rate was characteristic to seeds collected from free flowering plants as well as for those collected from individuals with isolated flowers. Capacity for self-pollination (autogamy) was stated for the target species. In contrast to other species of the genus *Campanula* comparatively slightly expressed protandry was revealed. The obtained results point to the strong self-regeneration strategy of *Campanula kachetica*. Ex-situ conservation activities were undertaken. Collection of seeds of *Campanula kachetica* is deposited for long-term storage at the Caucasus Regional Seed Bank at the Plant Conservation Department of the National Botanical Garden of Georgia.

Keywords: *Campanula kachetica*, reproduction, seed, pollination, germination, ex-situ conservation.

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**PP31: TRADITIONAL FOLK KNOWLEDGE IN THE NATIONAL PARK OF
BABORS (NORTH EAST OF ALGERIA)**

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National Park Babors contains 500 taxa 3.48% are endemic. This endemism is left as follows 13 species *Asteraceae*, *Lamiaceae* 7 species *Umbellifereae*, *Poaceae* and *Scrofulariaceae* 5, *Brassicaceae* and *Caryophyllaceae* 4. The genus *Festuca* contains 4 species and *Teucrium*, *Silene*, and *Galium* only that 3. Note that six species are under pressure to learn *Abies numidica* from Lanno, *Moehringia stellaroides* Coss. *Saxifraga numidica* Mayor *Erodium battandieranum* Rouy, Mayor. In fact, these species are truly threatened. They are used as medicinal or ornamental plant. In our present work we will assign to each species status. This status will preserve the different habitats of the region, and thus safeguard the very special biodiversity Kabylia Babors. It will also promote the implementation of a conservation policy that takes into account the socio-economic concerns of local populations while preserving the flora and fauna in the context of sustainable development

Keywords: babors, endemism, threat, preservation

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PP32: ALLELIC DIFFERENCES IN THE FLOWERING LOCUS T2 GENE AMONG POPLAR SPECIES

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Vegetative growth and dormancy are associated with adaptation and development in woody plants. Poplar (*Populus spp.*) is an excellent woody-perennial model to study these events because of its rich genomic resources and large phenotypic variation. In poplar, vegetative growth and dormancy are controlled by the Flowering Locus T2 (FT2) gene. Specifically, FT2 promotes active vegetative growth in the absence of stress, but growth cessation in the presence of stress. The aim of this study was to identify allelic variation in the FT2 locus in a population of *Populus* species. Specific primers were designed to amplify and sequence a 3-kb genomic region including four exons and three introns. Amplified DNA fragments were cloned into the pGEM-T easy vector system and sequenced. Sequencing was performed using the CEQ 8000 genetic analysis system by Beckman Coulter. Laser gene (DNASTAR) was used to create multiple alignments to identify single nucleotide polymorphisms, small insertions or deletions (≤ 50 bp), and structural variants (> 50 bp). The preliminary findings greatly contribute to our understanding of how allelic variation in the FT2 locus causes phenotypic variation in adaptive growth in a woody perennial.

Keywords: Poplar, *FLOWERING LOCUS T2*, allelic variation, adaptation, vegetative growth, dormancy

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PP33: ATRIPLEX COMMUNITIES PHYSIOGNOMY IN THE WESTERN NORTH OF ALGERIA AND THEIR RESPONSES TO ANTHROPOGENIC DISTURBANCES

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This work focuses on Atriplex communities mapping in the west of Algeria. A physiognomic approach has been adopted on El Malah map window situated in the north of Tlemcen (Algeria). Vegetable plantings take 24.76% of total surface, fallow 21.06% and cereal growing 15.02%, without neglecting olive plantation that takes 3.85% of total surface. It seems that agricultural lands invade natural physiognomic vegetables. If we gather all surfaces out of natural vegetation, we observe that 77% of this window total surface is anthropogenic. As to the remaining surface (23%), communities of pure Atriplex halimus represent only 3.56% of total surface. We also note that this space is shared between Atriplex halimus and Atractylis humilis that remains one of overgrazing hints (indices). This species is gaining more space to the detriment of palatable species. Associated communities Atriplex halimus + Atractylis humilis represent 10.10 % of total surface. Can we talk about an irreversible degradation that affects Atriplex communities in the north of Tlemcen? However, we can clearly affirm nowadays that overgrazing added to climatic constraints, pastures scarcity and the absence of pasture surface rational management contribute to a strong degradation of these Atriplex communities.

Keywords: Atriplex communities, physiognomic, anthropogenic, mapping, West of Algeria.
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PP34: POLLEN MORPHOLOGY OF SOME ENDEMIC *Hedysarum* L. (Fabaceae) SPECIES

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Hedysarum genus is represented about 160 species in the world and with 21 species in Turkey, of which 11 of them are endemic. Taking into consideration of species diversity, distribution and endemism rate of the genus *Hedysarum*, Turkey can be pointed as a diversity hotspot within the other neighbour countries. Previous taxonomical studies indicate that, genus *Hedysarum* has some problems like large morphological variation and identification by insignificant characters. In this study, pollen morphology of 10 endemic species of *Hedysarum* from Turkey examined by light microscopy and scanning electron microscopy. The pollen grains of *Hedysarum* are tricolpate and prolate. There is a membrane on colpus which covered by granules. The ornamentation is reticulate. In equatorial view the pollen grains are elongated, and in polar view they are circular or triangular-obtuse.

Keywords: Pollen morphology, plant taxonomy, *Hedysarum* L.,
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PP35: STUDY ON PLANT DIVERSITY OF PARVAR PROTECTED AREA (Semnan Province, Iran)

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Plant diversity is a significant concept of ecology and vegetation covering management. Study area within the protected area of Parvar in Semnan province is located between 35°60'-35°53' N latitude and 53°19'-53°47' E longitude. Parvar Protected Area with an area of 66000 ha is located in northeastern of Semnan city (Semnan Province). The climate is arid and semiarid. The mean annual rainfall is about 300-350 mm and the mean annual temperature is 10.4°C. We used 4 transects and 110 plots each one with an area of 1 m² were established based on randomized-systematic method. Density of the species within each plot was recorded. Species properties including the related genus and family in addition to life form, growth form and biological type were determined. In this research 25 family, 35 genera and 61 species are found in the studying area, and the most density of them is related to compositae family. Also, because of mountainous condition, perennial plants with forbs life form have existed more than the others. The largest families of region are: compositae (10 species), Chenopdiaceae (7 species), Gramineae (6 species) and Caryophyllaceae (5 species), respectively. Hemicryptophyte with 30 species are the most frequent life forms in the area. The distribution of the 61 species is restricted to Irano-Turanian region. Of these, 24 species are endemic of Iran.

Keywords: Semnan, life form, Hemicryptophyte, randomized-systematic, Irano-Turanian

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**PP36: GENETIC STRUCTURE OF *Juniperus turbinata* IN ALGERIA.
IMPLICATIONS IN CONSERVATION**

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Juniperus turbinata Guss. is a species from the Mediterranean and Macaronesian regions that very often is located in isolated populations that correspond to environments in which soil and climatic conditions are unfavorable, such as coastal dune formations, litorals, cold moors or windy areas. *J. turbinata* is of great interest from the point of view of conservation since this species can be found in habitats given priority in the European Directive 92/43 EEC. In this work, as partial result of a global study on this species, we present results on the genetic variability of 6 Algerian populations as well as on the distribution of the genetic diversity using AFLP (Amplified Fragment Length Polymorphism) molecular markers. Results indicate that *Juniperus turbinata* is not genetically impoverished ($H=0.206$). Moreover we found genetic differentiation ($F_{ST}=0.14$) between populations, and geographic structure of the populations. From these results hypotheses can be established on the reasons of this genetic differentiation, as well as on the possible reasons of the genetic distribution of *J. turbinata* in Algeria. This work has been supported by a Ministry of Economy and Competitiveness CGL2011-30099 project grant to Pedro Sánchez Gómez.

Keywords: AFLP molecular markers, conservation genetics, *Juniperus turbinata*

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PP37: ENDEMIC PLANTS WITH MEDICINAL AND AROMATIC VALUE IN RİZE PROVINCE

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Rize territory has a rugged and mountainous terrain. This general topographic situation shows some differences in the vertical direction. Therefore, Rize's topography is divided into three sections: coastline and alluvial plains, mountainous area split by deep valleys and, high mountainous areas and glacial topography. These high mountains, in Rize and its around, are located among areas which has high endemism rate. These plants which contain 115 endemic taxa and some of them have an important worth in terms of medicinal and aromatic plants, also constitute important genetic resources of Rize.

Keywords: Endemic plants, medical, aromatic

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**PP38: TRADITIONAL RESOURCES EVALUATION OF DISTRICT SHANGLA,
PAKISTAN**

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Study on traditional resources evaluation was carried out during summer 2008 in various parts of district Shangla. The potential for sustainable livelihood development in the region was assessed by analysing the forest dwellers' livelihood assets and perceptions of the forest livelihood. The study also explores the uses of forest resources and the methodology is largely based on the Sustainable Livelihood Framework. The empirical analysis shows that local people protect forest resources with the view to producing forest goods, which are important for livelihood. The study inventoried 89 species belonging to 50 families which are used for various ethno-botanical purposes, such as multipurpose tree (9 Spp), timber wood (7 Spp), fuel wood (15 Spp), fodder (24 Spp), vegetables (9 Spp), medicinal (25 Spp), religious plants saved by Muslims (5 Spp) and Hindus (6 Spp), wild fruits (7 Spp), poisonous (8 Spp), tool making (6 Spp), condiments (4 Spp), brooming (3 Spp) and mud supported (2 Spp), thatching (6 Spp) and ornamental (5 Spp), while 24 species were recorded to have ethno veterinary medicine uses for the curing of different livestock ailments. A total of 9 medicinal plants were collected for commercial purposes and some handsome revenue was generated from their sale at local level. The study concluded that the area is rich in certain medicinal plants of commercial importance and possess great demand in the world market. They may contribute their share for the development of pharmaceutical industries in Pakistan and can become a source of sustainable income for the local community. Further study is, therefore, required to quantify the availability of species and to suggest new avenue for their conservation.

Keywords: Conservation, endangered, medicinal plants, ethno-botany, multipurpose plants.

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PP39: ANATOMICAL NOTES OF SECT. MINIMAE (Pascher) DAVLIAN., SECT. ANTHERICOIDES A. TERRACC. AND SECT. BULBIFERAE LEVICHEV BELONGS TO THE GENUS *Gagea Salis* B. (Liliaceae) IN TURKEY

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The cross section shape of basal leaf, the number of vascular bundles, the density of pith in peduncle, the type and the placement of specific tissues are important characters that can be used for separation of the section and species for genus *Gagea*. In this study, cross sections of basal leaf and peduncle, and the stoma structure at the surface sections were examined. The cross section of peduncle is orbicular at *G. graeca* and *G. bulbifera*, orbicular-sinuate at *G. confusa*. The pith comprises in a portion of 30% in the cross section in which *G. graeca* and *G. confusa*, 30% at *G. bulbifera*. The cross section shape of basal leaf of *G. graeca* and *G. confusa* are flat, *G. bulbifera* is flat to v-shaped. The vascular bundles are linear. The pith is becoming fistulose from immature. The pith consists of sponge parenchyma at *G. confusa* and *G. graeca*. The stomata of *G. bulbifera* is elliptical and the size is 20-25 x 13-14 µm, *G. graeca* narrowly elliptical and the size is 25-30 x 14-16 µm, *G. confusa* narrowly elliptical and the size is 28-36 x 17-18 µm.

Keywords: Anatomy, *Gagea*, Turkey

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PP40: MORPHOLOGY, ANATOMY, LEAF MICROMORPHOLOGY AND ECOLOGY OF ENDEMIC *Gagea bithynica* PASCHER (Liliaceae) IN TURKEY

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Gagea bithynica Pascher is distinguished from the other taxa of *Gagea* by having 1-3 flower, corymbus and glabrous inflorescence. The ridges and grooves of basal leaves are regular; ridges are thicker than the grooves; the stomata are elliptical and on the ridges, the ridges are wider around the guard cells; the ornamentation is granulate, micropapillate; covered with a scattered and thin layer of wax which is in the form of rods or stamps at the basal leaf. The ridges and grooves of cauline leaves aren't regular; the ridges are parallel to vessels and thicker than the grooves; grooves are tightly packed; the stomata are elliptical and on the ridges, the ridges are wider around the guard cells; the ornamentation is granulate, micropapillate; covered with a scattered and thin layer of wax which is in the form of rods or stamps at the cauline leaf. Cross-sectional shape of peduncle is circular, collenchyma is absent, sclerenchyma is a complete circle with 3-4 cell layer and located only on phloem. The pith comprises in a portion of 50% in the cross section. Basal leaf mesophyll structure consists of one layered palisade parenchyma and two layered sponge parenchyma. The cross section of basal leaf is triangular, adaxial side of basal leaves is rounded. There are three vascular bundle arranged in a v-shaped. The species has no collenchyma and sclerenchyma in the basal leaf. The stomata are orbicular to elliptical and the size is 18-22 x 15-18 µm. The flowering time is April and May. Its habitat is scrub, rocky slopes, dampy areas and clearings of conifer forests, elevation 655 -2100 m.

Keywords: Anatomy, Ecology, *Gagea bithynica*, Leaf micromorphology, Morphology

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**PP41: CONTRIBUTIONS TO THE ENDEMIC PLANTS OF ÇAL MOUNTAIN
(DALAMAN-MUĞLA-TURKEY)**

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Çal Mountain (Dalaman-Muğla-Turkey) which is located Western Mediterranean region of Turkey, is in the C2 squares according to Grid system. In the present study, the endemic taxa in area, IUCN categories of these taxa and the rate of endemism of the study area are distributed. As a result of field study between the years of 2012-2013, 400 plants were collected and localities and photographs of these plants were given. "Flora of Turkey and the East Aegean Islands" Vol 1-10 (Davis, 1965-1985; Davis et. al., 1988, Guner et. al., 2001) was used as reference in the identification of the plant samples. 150 taxa have been identified so far. Among them 20 taxa are comprised endemic plants. According to the threat categories assigned by IUCN in Turkish Red List, the 4 (20%), 4 (20%), 3 (15%), 1 (5%), 8 (40%) the endemic taxa distributed in Çal Mountain are categorized as LC, EN, VU, CR and NT, respectively. The genus containing endemic taxa are Alyssum (3), Arenaria (1), Aubrieta (1), Dianthus (1), Digitalis (1), Ebenus (1), Echinops (1), Eryngium (1), Heldreichia (1), Minuartia (1), Papaver (1), Quercus (1), Rosularia (1), Silene (3), Thlaspi (1), Vincetoxicum (1). While 13 (65%) of the endemic taxa are the members of Mediterranean phytogeographic region; the remaining 7 taxa (35%) are not to be specified to any phytogeographic region. The endemism rate of the area was determined as 13.3 % according to the identifications that have been done until this time.

Keywords:Çal Mountain, endemic plants, IUCN categories, Dalaman, Muğla, Turkey

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PP42: POLLEN MORPHOLOGY OF ENDEMIC *Aristolochia* L. SPECIES IN TURKEY

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Aristolochia genus is represented by 27 species with 56 % endemism rate in Turkey. In this study, pollen morphology of 15 endemic species of *Aristolochia* from Turkey examined by light microscopy and scanning electron microscopy. Pollen grains are eurypalynous and inaperturate. Pollen shape is sphaeroidal and AMB shape is circular, also pollen grains are tectate. Exine ornamentation has a taxonomical significance and showing differences between species; most frequented ornamentation types are verrucate, areolate, perforate, foveolate, fossulate and rugulate.

Keywords: *Aristolochia*, pollen morphology, electron microscopy, Turkey

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PP43: CONTRIBUTIONS TO THE THE FLORA OF THE AREA BETWEEN THE TOWNS OF KARAÖREN-YUVA-KARKIN (AKSARAY/TURKEY)

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This research was carried out in order to make some contributions to the Flora of the Area between the Towns of Karaören-Yuva-Karkın (Aksaray/Turkey). Materials of this investigation cover 622 plant samples collected from the research area during the vegetation seasons among February and November in 2013. Field studies lasting one day a week in the form of day trips are made periodically. All specimens were dried according to the standard herbarium methods and deposited in Aksaray University Herbarium. During floristic surveys, 147 Spermatophyta taxa belonging to 123 genera and 39 families were recorded from that area. 123 species are Angiospermae (Dicotyledones 111, Monocotyledones 12). There are 15 endemic taxa in the area and endemism percentage is 11,2 %. The phytogeographical regions of only 47 taxa from collected material have been determined. These are following: Irano-Turanian elements 33 (22,4 %), Mediterranean elements 8 (5.4 %), Euro-Siberian elements 6 (4,0 %), widespreads and unknowns 100 (68,0 %). The families represented by the highest number of taxa in the research area were: *Asteraceae* 26 (17,6 %), *Fabaceae* 14 (9,5 %), *Brassicaceae* 13 (8,8%), *Papaveraceae* 9 (6,1%), *Ranunculaceae* 7 (4,7%), *Caryophyllaceae* 7 (4,7%), *Lamiaceae* 6 (4,0%), and *Poaceae* 6 (4,0%).

Keywords:Aksaray, Flora, Karaören, Karkın, Turkey, Yuva

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**PP44: MORPHOLOGY, ANATOMY, MICROMORPHOLOGY AND PALYNOLOGY
OF *Haplophyllum pumiliforme* HUB.-MOR. & REESE (Rutaceae), AN ENDEMIC
SPECIES FROM ANATOLIA**

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Haplophyllum A.Juss. is one of the most species rich genera of *Rutaceae* family. Many of its species exhibit a narrow geographic range, which makes them particularly vulnerable to extinction. In this study, morphological, anatomical, palynological and micromorphological characteristics of endemic *H. pumiliforme* grows only in Anatolia is examined in order to understand the usefulness of these characteristics for systematics purposes. Based on our extensive field and literature surveys, amended and expanded descriptions of the species are given. Anatomical, palynological, micromorphological characteristics of this species are reported for the first time in this study. Anatomical characters i.e. mesophyll structure in leaves, shape of vascular structure in midrib, number of cortex layers and sclerenchymatic cell layers in stem are found to be important species specific characters. In addition, size, shape and sculpturing pattern of pollen grains of the species and seed characters are presented, using light and scanning electron microscopy to evaluate the taxonomic relevance of macro and micro-morphological.

Keywords: *Haplophyllum pumiliforme*, morphology, anatomy, micromorphology, Anatolia
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PP45: MOLECULAR CLONING AND ANALYSIS OF A NOVEL GENE CODING FOR BCCP SUBUNIT FROM *Aleurites moluccana*

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Aleurites moluccana L. is a perennial, woody plant belonging to the family Euphorbiaceae and is widely distributed in the tropical and subtropical regions of the world. It is grown as a roadside tree in South China regions. The oil content of its seed is higher than other oil plants, such as *Jatropha curcas* and *Camellia oleifera*. *Aleurites moluccana* L. is considered to be a promising energy plant because of its seed oil could be used to produce biodiesel and bio-jet fuel. In addition to the use of its seeds as bio energy raw materials, the bark and leaf and kernel of *Aleurites moluccana* have various medical and commercial uses. Previous studies have confirmed that ACCase play an important regulation function during oil biosynthesis and accumulated in plant seeds. The plant growth and oil content in *Arabidopsis* were regulated by expression levels of *accB* gene coding for BCCP subunit, which is one of the four subunits of ACCase II. In this study, a novel gene coding for BCCP subunit was cloned from *Aleurites moluccana* L. by using homology cloning method combined with RACE technology. The full-length cDNA sequence isolated was 1188bp in which contained a 795bp open reading frame coding for 265 amino acids. The deduced amino acid sequence of the cDNA clone contained a biotinylated domain which located between 190aa and 263aa. After amino acid sequence comparison analysis by blastx, the results showed that the *accB* gene of *Aleurites moluccana* L. shared high identity with *Vernicia fordii*, *Jatropha curcas* and *Ricinus communis*, which were 85%, 77% and 70%, respectively. The transcript of *accB* gene and the oil content were determined, it revealed that oil content increased with seed maturation, and *accB* gene was expressed strongly in the middle stages but weakly in early and later stage during *Aleurites moluccana* seed development.

Keywords: *Aleurites moluccana*, *accB* gene, cloning, analysis

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**PP46: COMPERATIVE STUDY OF LEAF ANATOMY ON *Helianthemum* SPECIES
(Cistaceae) IN TURKEY**

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The genus *Helianthemum*, which widely distributed mostly Mediterranean region, consist of about 110 species in the world. *Helianthemum* was represented in the Turkish Flora by 17 taxa, 4 of which are endemic. In this study, the anatomical features of 15 taxa of the genus were investigated and exhibited a number of differences. For preparing cross section of leaves were used paraffin method and Sartur Reagent. The results were discussed and demonstrated by photographs. The surface anatomy of the leaf shows that the anomocytic stomata are framed by the epidermis cells. The epidermis is covered by a thin cuticula layer on the outside. The mesophyll is composed of elongated rectangular palisade parenchyma cells and irregularly arranged spongy parenchyma cells. The type of the vascular bundles is open collateral and included crystals. The most important characters are as follow: variety of indumentum, size of epidermis cells, existing of palisade parenchyma on both surfaces and stomata type.

Keywords:*Helianthemum*, *Cistaceae*, Anatomy, Leaf, Turkey

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PP47: KARYOLOGICAL AND ANATOMICAL STUDIES ON *Helianthemum salicifolium* (L.) MILL. IN TURKEY (Cistaceae)

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The genus *Helianthemum* Mill., which consists of 12 species, 3 subspecies and 2 varieties in Flora of Turkey, includes 17 taxa. 4 of these taxa are endemic for Turkey. In karyological studies, the relative lengths, arm ratios and centromeric index were calculated and used to classify the chromosomes, and determine homologous chromosomes. The somatic metaphase chromosome number is determined as $2n=20$, basic chromosome number of *H. salicifolium* is $X=10$. Karyotype formula on the species consists of 7 median and 3 submedian pairs. In anatomical studies, the paraffin method and safranin reagent were used for cross sections of stem, root and leaf. In the stem cross section of *H. salicifolium*, 2-3 layered chlorenchyma and 2-3 layered of irregularly oval, squarish or rectangular collenchyma are composed under the epidermis. The vascular bundles are arranged circular. The leaf type is equifacial (isilateral). The surface anatomy of the leaf shows that the anomocytic stomata are framed by the epidermis cells.

Keywords: *Helianthemum salicifolium*, Cistaceae, Anatomy, Karyology

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**PP48: SEED MICROMORPHOLOGY OF ANNUAL *Helianthemum* SPECIES IN
TURKEY (Cistaceae)**

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The genus *Helianthemum* Mill., which consists of 5 annual and 12 perennial taxa in Flora of Turkey, includes 17 taxa. 4 of these taxa are endemic for Turkey. In this study, the seed - coat micromorphological characteristics of *H. salicifolium*, *H. ledifolium*var. *ledifolium*, *H.ledifolium* var. *lasiocarpum*, *H. ledifolium* var. *microcarpum* and *H. aegyptiacum* are studied by SEM. The shape, size and colour of seeds are inspected on LM. All characteristics of the seeds are described, illustrated, and compared. The seed shape among the studied taxa showed wide range of variations. LM revealed most of the seeds vary from ovate to oblong or rhomboid. The result of SEM at higher magnification showed 2 types of seed surface patterns: rugulate - verrucate and tuberculate.

Keywords:*Helianthemum*, annual, seed-coat, SEM, micromorphology

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PP49: SEED CHARACTERISTICS AND CONSERVATION OF RELICT *Alnus glutinosa* (L.) GAERTN. POPULATIONS IN EASTERN MEDITERRANEAN REGION OF TURKEY

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Alnus glutinosa (L.) Gaertn. is a tree species largely distributed in Europe and northern Turkey. The relict populations of the species are also found in the Eastern Mediterranean part of southern Turkey. *A. glutinosa* is mostly seen in the riparian areas of streams in the region. In this study, the cones of the species were collected from six different populations in Adana, Osmaniye, and Kahramanmaraş provenances in both 2012 and 2013. For each population, the percentage of sound seed rates and germination percentages were determined. Morphological traits of cones and seeds (length, width, thickness, and weight) were also measured (Table 1). In order to determine the chilling requirement, the chilled (2, 4, 6, and 8 weeks) and non-chilled seeds were taken to the germination tests at 24 °C. All the values were calculated as the average of two years (2012-2013). The overall average 1000-seed weight, sound seed percentage, and germination percentage were 1.24 g, 42.4 %, and 29.1 %, respectively. The study demonstrated that the seed has non-deep physiological dormancy and generally required about 2-4 w prechilling. Although there were significant differences between the years in some provenances, the overall average values were relatively similar in both 2012 and 2013. Since this tree species is distributed in the small populations and mostly damaged in riparian areas of the region, the new programs and projects should be carried out for the conservation of the species in the natural distribution sites and outside its natural sites.

Keywords: *Alnus glutinosa*, relict population, seed, conservation

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PP50: THE GENE RESOURCES AND CONSERVATION OF DEER APPLE (*Malus trilobata* c.k. Schneid) IN THE MERSİN REGION

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Malus trilobata (Poir.) [Deer apple], [Rosaceae] is one of the rare wild fruit trees in Turkey. It's distributed individually or very rarely in small groups. Mersin region has been surveyed in order to determine the regional distribution of the species and to collect the ethnobotanical data of it. For each tree, major characteristics were recorded including diameter, height, land use, aspects, and coordinates. The coordinates of each tree were added on digital maps. After the result of field trips, 1221 trees were recorded in Anamur (137), Bozyazı (171), Erdemli (22), Gülnar (243), Mut (376), and Silifke (272) counties, mostly eastern part of the Mersin region. The trees were on agricultural land (59.4 %), forest areas (39.7 %), and cemeteries (0.9 %). The aspects of *M. trilobata* individuals' locations varied greatly, including east (21.5 %), south (21.3 %), north (20.2 %), northeast (15.7 %), southeast (13.5 %), northwest (4.1 %), west (2.6 %), and southwest slopes (1.0 %). The lowest, the highest, and the average elevation of the species in the region were 125 m, 1427 m, and 921 m, respectively. The tallest height, the average height, the largest diameter, and the average diameter were measured as 16.8 m, 6.1 m, 81.8 cm, and 21.9 cm, respectively. The leaves and fruit of deer apple were used and consumed by local people for health and other different purposes. This rare scattered forest tree species should be conserved in natural sites and the population of the species should be restored by producing and planting of the seedlings.

Keywords: deer apple, *Malus trilobata*, Mersin, conservation

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PP51: ESSENTIAL OIL COMPOSITION OF LOCAL ENDEMIC *Grammosciadium confertum* HUB.-MOR. & LAMOND (Apiaceae) FROM TURKEY

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The genus *Grammosciadium* is represented with the 6 species in Turkey. It is named as “geyik sirasi” in Turkish. In this study, the essential oil of *Grammosciadium confertum* Hub.-Mor. & Lamond was analysed for the first time. The essential oil yield is 0.1 (v/w). Twenty nine components were identified, accounting for 89.6% of the total oil. The six most abundant components (salvial-4(14)-en-1-one (14.4%), caryophyllene oxide (8.5%), aristol-9-en-3-ol (8.1%), isolongifolone (7.1%), spathulenol (6.9%) and nor-copaanone (6.6%) represented 51.6 of the oil. The results were discussed with the genus pattern in means of chemotaxonomy.

Keywords: *Grammosciadium confertum*, *Apiaceae*, endemic, essential oil, chemotaxonomy

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**PP52: COMPOSITION OF THE ESSENTIAL OILS OF TWO *Chrysophthalmum*
Schultz Bip. (Asteraceae) SPECIES**

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The essential oils obtained from the aerial parts of *Chrysophthalmum dichotomum* Boiss. & Heldr. and *C. montanum* (DC.) Boiss. were analyzed by using GC and GC/MS. Sixty compounds and forty five compounds representing 94.0% and 90.0% of the oil were identified respectively. The main compounds of *C. dichotomum* were butanol (20.2%), cyclohexadecane (13.5%), nerolidol (13.4%), tributyrin (11.2%), muurolol (10.9%) and also the major compounds in *C. montanum* oil were caryophyllene oxide (20.0%), spathulenol (18.2%), acetic acid (10.3%), muurolol (9.7%) and alpha-cadinol (4.9%).

Keywords:*Chrysophthalmum dichotomum*, *C. montanum*, essential oil, butanol, caryophyllene oxide

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**PP53: COMPOSITION OF THE ESSENTIAL OIL OF PULICARIA ARMENA
BOISS. & KOTSCHY (Asteraceae), AN ENDEMIC SPECIES TO TURKEY**

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The genus *Pulicaria* Gaertner is represented with the 6 taxa in Flora of Turkey and just only this species is endemic to Turkey in the genus patterns. Its Turkish name is "boz yaraotu". The composition of the essential oil isolated from the aerial parts of *Pulicaria armena* Boiss. & Kotschy collected from Ağrı – Patnos province during the flowering stage. The essential oil of the plant was analysed by GC and GC–MS. system. *Pulicaria armena* essential oil has a yield of 0.2% (v/w), consist of sixty six compounds representing 92.5% of the essential oil. The present study has shown that the oil consisted mainly of germacrene D (11%), caryophyllene oxide (10.1%), pinocarvone (7.3%), muurolol (7.2%) and spathulenol (6.3%) components.

Keywords: *Pulicaria armena*, *Asteraceae*, essential oil, germacrene D, caryophyllene oxide
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**PP54: ESSENTIAL OIL COMPOSITION OF ENDEMIC *Chrysophthalmum gueneri*
AYTAÇ AND ANDERB (Asteraceae) FOR TURKEY**

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Chrysophthalmum gueneri Aytac and Anderb (*Asteraceae*) was collected from Antalya province in Turkey and its essential oil was obtained by hydrodistillation. The chemical composition of the oil was investigated by GC and GC-MS. The investigation led to the identification of 48 constituents, representing 87.4% of the total oil. The main components of the oil were beta-pinene (18.7%), 2 methyl butanoic anhydride (14.6%), butanol (12.3%), alpha-pinene (7.4%) and beta-caryophyllene (3.3%). The results were discussed with the genera patterns and natural product.

Keywords: *Chrysophthalmum gueneri*, *Asteraceae*, essential oil, GC-MS, beta-pinene
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**PP55: TAXONOMIC STUDIES ON ENDEMIC SPECIES FROM TURKEY:
Helianthemum nummularium (L.) Mill. subsp. *lycaonicum* Coode & Cullen (Cistaceae)**

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The genus *Helianthemum* Mill. includes 12 annual or perennial species in the Flora of Turkey, 4 of which are endemic. In this study, morphological, micromorphological and palynological characteristics of the endemic *Helianthemum nummularium* (L.) Mill. subsp. *lycaonicum* Coode & Cullen, are studied. This species is grown on steppe, chalky and limestone slopes in Turkey. In morphological studies, detailed descriptions of the *H. nummularium* subsp. *lycaonicum* and characteristic features are given. Besides, seed morphology is studied by SEM. According that, seeds are ovate. The seed coat ornamentation is verrucate. The pollen grains are tricolporate, medium sized and prolate. Apocolpial area is rather narrow. Exine is very thin. Exine ornamentation is identified as striate-perforate on SEM studies.

Keywords: *Helianthemum nummularium* subsp. *lycaonicum*, *cistaceae*, endemic, morphology, palynology, seed micromorphology.

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**PP56: SPECIES DIVERSITY OF PEARS IN PAKISTAN: 1. PRELIMINARY
REPORT OF THE 18S rRNA ANALYSES**

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Pear allies belonging to the genus *Pyrus* are the traditional selections widely available as landraces in the traditional field boundaries, conventional forms, kitchen garden and as feral in the wild, mostly in temperate areas of Pakistan. These land races possess overlapping morphological traits and lack sharply differentiating taxonomic characters, thus not established taxonomically up-till now. Thus 18S rRNA nucleotide sequence analyses were started to differentiate three landraces at molecular level. We communicate the preliminary results obtained for three land races viz. Kacha Tora Tangai (Ktt), Ghata Tora Tangai (Gtt) and Ghata Zira Tangai (Gzt). The BLAST nucleotide sequence of Ktt revealed 99% maximum identity and quarry cover with the reference sequences of *P. pyrifolia* cvs. Sunwhang and Miwhang, available at NCBI. The land race Gtt proved 100% maximum identity and quarry cover with *P. pyrifolia* cv. Imamuraaki. Similarly Gzt provided 97% maximum identity and quarry cover with *P. communis* cvs. Pachkan's Triumph, Beurre, and 97% maximum identity and quarry cover with *P. communis* cv. Conference and *P. pyrifolia* cv. Okusankichi. The study concluded that both the land races Ktt and Gtt are *P. pyrifolia* in origin, whereas Gzt might be a hybrid of *P. communis* and *P. pyrifolia*.

Keywords: Pakistan, pyrus, pear, species diversity, 18S rRNA

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**PP57: PHYLOGENETIC RELATIONSHIPS AMONG SOME TAXA OF THE GENUS
*Salvia***

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With 99 native species and over 53% endemism ratio, Turkey is one of the major diversity centers for the genus *Salvia* (*Lamiaceae*). The phylogenetic relationships among *Salvia euphratica* sensu lato and its closely related species were studied by using sequences of two different regions. To understand which DNA region would be more informative and congruent with the latest taxonomic concept in the genus, one region (Internal Transcribed Spacer; ITS) from genomic DNA and one region (trRNA-Val; trnV) from chloroplast DNA were selected. Seven endemic taxa which belong to section *Hymenosphaea* were analyzed and phylogenetic trees were constructed by using Maximum Likelihood (ML) method. While 19 variable sites were observed in ITS sequence, only one site was found in the sequence of trnV region. As expected, phylogenetic tree constructed by using ITS region was more informative than the tree constructed by using trnV region. Studied taxa were phylogenetically separated from one another and form different subclusters when ITS region was used. However, only *S. euphratica* var. *euphratica* and *S. euphratica* var. *Leiocalycina* were separated from the remaining taxa when trnV region was used in the phylogenetic tree. Therefore it can be suggested that ITS region (nrDNA) is more useful and informative to understand phylogenetic relationships among the taxa of *Salvia*.

Keywords: cpDNA, ITS, phylogeny, rDNA, *Salvia*, trnV

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PP58: PRODUCTION OF BARK STORAGE PROTEINS ASSOCIATED TO DELAYED LEAF SENESCENCE AND DROUGHT TOLERANCE IN *Populus nigra*

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Accomplishment of the whole genomic sequences of *Populus* provides an opportunity to interrogate the impact of environmental stress factors on the trees. In the current study, adaptation of *Populus nigra* to drought stress was firstly examined in a field trial. After determination of contrasting tolerance to drought in the field, a greenhouse experiment was carried out with the most resistant (N.62/191) and susceptible (N.03.368.A) two *P.nigra* clones. During the experiment one year old trees were submitted to a moderate and severe water deficit by withholding irrigation and ended with re-watering of the drought treated trees. Microarray experiments conducted on the leaves collected at these different water deficit levels and compared with the control plants for both genotypes. The microarray analysis extracted 2453 and 5851 probe sets for the resistant and sensitive genotypes, respectively. The sensitive genotype was characterized with severe defoliation and loss of leaf water content under drought stress. The highest expression of the genes such as NAC (JA), and ap2/erf transcription factors in the sensitive genotype indicated a potential role of hormones controlling the leaf senescence. Expression of the genes involved in proteolysis, cell wall degradation and carbohydrate catabolism in the sensitive genotype were associated with drought induced sugar starvation and nutrient mobilization processes. Contrary to the sensitive genotype, the drought resistant black poplar genotype did not defoliate until severe drought level. Microarray results indicated that maintenance and recovery of drought traded leaves of the resistant genotype could depend on enhanced synthesis of bark storage proteins during drought stress. These proteins were suggested to be produced in stress treated leaves and remobilized to stem and roots under drought to be used as an energy source in the drought treated organs. By this way resistant clones could depend on more prolonged drought condition without leaf defoliation or shoot desiccation. The potential role of these bark storage proteins on drought tolerance of trees was initially demonstrated in this work.

Keywords: *Populus nigra*, drought, microarray genome profiling

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